ERCB

Petro-Canada

Applications for Eleven Well Licences, One Multiwell Gas Battery Licence, and Two Pipeline Licences Sullivan Field

June 8, 2010

Energy Resources Conservation Board

ENERGY RESOURCES CONSERVATION BOARD
Decision 2010-022: Petro-Canada, Applications for Eleven Well Licences, One Multiwell Gas Battery Licence, and Two Pipeline Licences, Sullivan Field

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ENERGY RESOURCES CONSERVATION BOARD
Calgary Alberta

PETRO-CANADA
APPLICATIONS FOR ELEVEN WELL LICENCES, ONE MULTIWELL GAS BATTERY LICENCE, AND TWO PIPELINE LICENCES
SULLIVAN FIELD

Decision 2010-022
Applications No. 1517168, 1517170, 1574414, 1574366, 1574409, 1517148, 1520922, 1517151, 1520923, 1517160, 1517176, 1520388, and 1513051

1 DECISION

Having carefully considered all of the evidence, the Energy Resources Conservation Board (ERCB/Board) hereby approves Applications No. 1517168, 1517170, 1574414, 1574366, 1574409, 1517148, 1520922, 1517151, 1520923, 1517160, 1517176, 1520388, and 1513051 subject to the conditions set out in Appendix 1.

2 INTRODUCTION

In March 2009, Suncor Energy Inc. (Suncor) and Petro-Canada announced that they had merged and would operate corporately under the Suncor name. The Board notes that the acquisition took place after the close of the public hearing of the applications; therefore, this decision report refers to Petro-Canada as the applicant. Appendix 2 contains definitions for selected terms and acronyms used in this decision.

2.1 The Applications

Petro-Canada submitted eleven gas well applications, in accordance with Section 2.020 of the *Oil and Gas Conservation Regulations* (*OGCR*), one multiwell gas battery application, in accordance with Section 7.001 of the *OGCR*, and a pipeline application, in accordance with Part 4 of the *Pipeline Act* for approval to construct and operate two pipelines, one for the purpose of transporting sour gas and the other to transport fuel gas.

Applications No. 1517168 and 1517170 are for licences to drill two directional gas wells from an existing surface location in Legal Subdivision (LSD) 6, Section 15, Township 18, Range 5, West of the 5th Meridian, to projected bottomhole locations in LSD 12-11-18-5W5M and LSD 4-22-18-5W5M.

Application No. 1574414 is for a licence to drill one directional gas well from a surface location in LSD 16-35-17-5W5M[1] to a projected bottomhole location in LSD 2-11-18-5W5M.

Applications No. 1574366 and 1574409 are for licences to drill two directional wells from a surface location in LSD 1-2-18-5W5M to projected bottomhole locations in LSD 11-2-18-5W5M and LSD 12-36-17-5W5M.

[1] This surface location would be the same as for Applications No. 1574366 and 1574409, as the surface location is bisected by the LSD boundary.

Applications No. 1517148 and 1520922 are for licences to drill two directional wells from an existing surface location in LSD 10-25-17-5W5M to projected bottomhole locations in LSD 2-25-17-5W5M and LSD 7-25-17-5W5M.

Application No. 1517151 is for a licence to drill one directional gas well from a surface location in LSD 2-19-17-4W5M to a projected bottomhole location in LSD 12-18-17-4W5M.

Applications No. 1520923 and 1517160 are for licences to drill two directional gas wells from a surface location in LSD 3-19-17-4W5M to projected bottomhole locations in LSD 5-19-17-4W5M and LSD 16-24-17-5W5M.

Application No. 1517176 is for a licence to drill one directional gas well from an existing surface location in LSD 7-7-17-4W5M to a projected bottomhole location in LSD 7-6-17-4W5M.

The purpose of all wells would be to obtain gas production from the Rundle Group. The maximum hydrogen sulphide (H_2S) concentration would be about 145.8 moles per kilomole (mol/kmol) (14.58 per cent), and the cumulative drilling H_2S release rate would be 0.59 cubic metres per second (m^3/s).

Application No. 1520388 is for approval to construct and operate a multiwell gas battery in LSD 11-8-17-4W5M. The facility would dehydrate and compress sour gas with a maximum H_2S content of 150 mol/kmol (15.0 per cent) and would have a maximum continuous sulphur emission rate of 0.02 tonnes per day and a corresponding emergency planning zone (EPZ) of 5.47 kilometres (km).

Application No. 1513051 is for approval to construct and operate two pipelines, one for the purpose of transporting sour gas and the other to transport fuel gas.

The sour gas pipeline would consist of a gathering system to transport gas from five well pads proposed at LSDs 1-2-18-5W5M, 10-25-17-5W5M, 3-19-17-4W5M, 7-7-17-4W5M, and 8-7-17-4W5M to a proposed multiwell gas battery at LSD 11-8-17-4W5M. From the battery, a trunk line would transport the dehydrated and compressed gas to a tie-in point at LSD 2-22-14-4W5M. From this tie-in point, the gas would be transported by Devon Canada via an existing pipeline to the Devon-operated Coleman Gas Plant. The length of the proposed gathering system and the trunk line would be about 55.46 km, and the outside diameter (OD) would range from 88.9 millimetres (mm) to 273.1 mm. The proposed gathering system and the trunk line would transport sour gas with a maximum H_2S concentration of 150 mol/kmol (15.0 per cent). The maximum calculated EPZ associated with the proposed pipeline would be 7.23 km.

The proposed fuel gas pipeline would be placed in the same ditch as the trunk line and gathering lines. It would tie into an existing Suncor fuel gas line at LSD 2-22-14-4W5M and transport sweet gas to the five well pads. It would be about 55.46 km in length, with ODs ranging from 60.3 to 88.9 mm.

Collectively, the applications are referred to hereinafter as the Project (see Figure 1: Applied-for Wells, Battery, Pipelines, and Alternative Proposed Routes).

2.2 Interventions

The Board received objections from area landowners, residents, grazing lease and allotment holders, outfitters and guides, ranchers, the Municipal District (MD) of Ranchlands No. 66, and wilderness camp and campground operators.

Interveners were concerned about public safety and health; the environment, including impacts on wildlife, flora, and fescue grasses; air and water quality; impacts on ranching; cumulative impacts of development within the Kananaskis and Eastern Slopes region; and locations of the proposed pipelines, facility, and wells. In addition, they raised concerns regarding Petro-Canada's environmental assessment (EA) and its public consultation program.

2.3 Prehearing Meeting and Hearing

Having regard for the unresolved concerns and objections, the Board directed that the applications be considered at a public hearing. The Board decided to hold a prehearing meeting to determine the scope and issues to be considered at a hearing of the applications, the timing and location of the hearing, standing, intervener costs, and other procedural matters.

The Board held a prehearing meeting in Longview, Alberta, on March 18, 2008, before Board Members J. D. Dilay, P.Eng. (Presiding Member), G. J. Miller, and B. T. McManus, Q.C., Vice-Chairman. The Board released its ruling on the prehearing meeting as *Decision 2008-029: Petro-Canada, Applications for Wells and Associated Pipeline and Facility Licences, Sullivan Field* on April 16, 2008.

In *Decision 2008-029*, the Board established a proceeding schedule for the submission of and response to information requests by various parties, as well as a schedule for the evidentiary submissions of parties. The Board also directed that the hearing of these applications commence on August 18, 2008.

Throughout June 2008, the Board received a number of adjournment requests from the Indian Graves Campground, the Big Loop Group, Royal Adderson and Bar AD Ranches Ltd. (Adderson), and the Pekisko Group that the hearing be adjourned to a later date than August 18, 2008. The Board considered the interveners' and Petro-Canada's submissions on the adjournment requests and on July 17, 2008, it advised the parties that it had rescheduled the hearing to commence on November 12, 2008.

On July 9, 2008, the panel and ERCB staff conducted an examination of the Project area by helicopter.

The Board held a public hearing in High River, Alberta, which commenced on November 12, 2008, and was completed on January 30, 2009. The hearing was held before Board Members J. D. Dilay, P.Eng. (Presiding Member), J. D. Ebbels, and B. T. McManus, Q.C., Vice-Chairman. Parties who participated at the hearing are listed in Appendix 3.

The Board considers that the record of the proceeding closed as of February 4, 2010.

On February 25, 2010, J. D. Ebbels passed away. J. D. Dilay and B. T. McManus constitute a quorum and their deliberations are set out in this decision report.

2.4 Interveners

The Board decided that the following parties may be directly and adversely affected by the Board's decisions on the applications.

The Big Loop Group—comprising the MD of Ranchlands No. 66, Big Loop Cattle Co. Ltd., EP Ranch Ltd., High Lonesome Ranch Limited, Pekisko Creek Ranch & Cattle Co. Ltd., and Alec C. Burke and Family—expressed concern regarding Petro-Canada's proposed trunk line through what it perceived to be an undisturbed, pristine wilderness area.

Adderson held the position that the proximity of the proposed wells, central facility, and associated access roads to the Bar AD Ranch would negatively impact both the ranching operations and the quality of life for the Adderson family.

The Stoney Nakoda Nation—comprising individual members of the Bearspaw First Nation, the Chiniki First Nation, the Wesley First Nation, the Stoney Nakoda Nation, and the community of Eden Valley located on the Eden Valley Indian Reserve No. 216 (Eden Valley Reserve)—held the position that the proposed Project was contrary to the spirit of Treaty No. 7 and would negatively impact aboriginal and treaty rights. The Stoney Nakoda Nation submitted that if impacts could not be mitigated, the Project would create unnecessary health risks to the residents of the Eden Valley Reserve. It asserted that more cost-effective alternative routes should be explored.

The Pekisko Group was an association of ranching families dedicated to responsible stewardship of the ranchlands along the southeast slopes of the Rockies, west and southwest of Longview, Alberta. The Pekisko Group included the Willow Creek Stock Association (Willow Creek Grazing Allotment), the Timber Creek Grazing Allotment (Rocking P. Ranch, TL Cattle Co., Mapiatow Ranch), Anchor P. Cattle Co., Home Place Ranch, Mt. Sentinel Ranch, Bluebird Valley Ranch, D Ranch, Spruce Grazing Co-op, Ms. Kim Cochlan, Larry Dayment Ranch, Phil Rowland Ranch, and Bow Vista Farms. The Pekisko Group argued that the Project constituted unwarranted and damaging industrial intrusion into the Southern Foothills area.

2.5 Discretionary Participants

At the prehearing meeting, the Board granted discretionary participant status to Roger Douglas (on behalf of the Alberta Wilderness Association), Harvey Gardner (on behalf of Bluebird Valley Ranch), Margaret Dowdell, Julie Walker (on behalf of Full Circle Adventures), Francis Dover (on behalf of the Priddis-Millarville Residents Association), Mack Blades (on behalf of John Scott Motion Pictures), and Francis Gardner. The discretionary participants made short presentations at the hearing about their issues of concern. They raised a number of matters referenced in Section 2.2.

2.6 Procedural Matters

The Board received numerous procedural and interlocutory motions and requests between April 16, 2008, the date of the issuance of *Decision 2008-029,* and November 12, 2008, the start of the hearing.

These included

- requests for a formal information request process,

- a notice of question of constitutional law,
- requests for modified submission dates for information requests,
- requests for further rounds of information requests,
- adjournment requests,
- requests for a site visit,
- requests for further and better answers to information requests,
- motions for notices to attend for witnesses,
- motions to compel answers to information requests, and
- motions to exclude expert reports.

Many of these matters were complex and entailed numerous submissions from parties. The Board rendered its decisions on each in turn, and while not all are mentioned below, all are reflected in the record of this proceeding.

The hearing commenced on November 12, 2008. The Board received two motions from parties during the final days of the hearing, namely on January 28 and 30, 2009, each to compel the attendance of witnesses at the hearing. Following the hearing, in January and February 2009, parties filed various responses with the Board to undertakings given during the hearing.

On February 19, 2009, the Board advised parties that it had become aware of a matter involving one of its employees and a Petro-Canada employee. Because it was concerned as to whether or not the matter may have had an impact on the proceedings, the Board arranged for a third-party investigation of the matter to be conducted. On March 16, 2009, the Board advised parties of the results of that investigation and the Board's decision that it found that the matter had no impact on the proceeding. Some of the parties subsequently appealed this decision to the Alberta Court of Appeal. The parties' Leave to Appeal application was heard on September 17, 2009. The Court of Appeal denied Leave to Appeal in written reasons dated September 21, 2009 (see *Big Loop Cattle Co. Ltd. et al.* v. *Alberta [Energy Resources Conservation Board] and Petro-Canada Oil and Gas*, 2009 ABCA 302).

On April 8, 2009, after the conclusion of the investigation, the Board issued its decisions to deny the two motions brought by parties at the end of the hearing to compel the attendance of witnesses. During the remainder of April 2009, the Board and Petro-Canada each issued written questions to one of the parties' witnesses who prepared a report but who did not give evidence at the hearing. The Board also imposed deadlines on parties for final written argument.

On May 7, 2009, one of the parties brought a motion for a stay of proceedings due to, among other things, the then-pending Leave to Appeal application. The Board issued its decision to deny the motion on June 8, 2009.

Throughout June 2009, the Board received numerous requests from parties for extensions of the deadlines for final written argument. The Board extended the deadlines for final written argument three times, out of an abundance of fairness and process, the last extension being granted on June 25, 2009.

On September 22, 2009, following the submission of written final argument by the parties, the Board asked supplemental questions of Petro-Canada about its argument and set out deadlines for responses. Petro-Canada asked for an extension to the deadlines, and the Board granted the extension on October 7, 2009. Petro-Canada submitted its responses on November 23, 2009.

On November 27, 2009, some of the parties brought motions to reopen the hearing and have the Board hear further evidence and argument on the Project. In addition to the motions to reopen the hearing, one of the parties' motions contained three separate review and variance requests relative to three separate directions of the Board. The Board issued its decisions to deny both motions and the three review and variance requests on February 4, 2010, and the Board considers the hearing to have closed on that date.

3 ISSUES

The Board considers the issues respecting the applications to be

- need for the Project,
- consultation,
- route and site selection,
- public safety,
- environmental effects,
- socioeconomic considerations, and
- question of constitutional arguments.

In reaching the determinations contained in this decision, the Board has considered all relevant materials constituting the record of this proceeding, including the evidence and argument provided by each party. Accordingly, references in this decision to specific parts of the record are intended to assist the reader in understanding the Board's reasoning relating to a particular matter and should not be taken as an indication that the Board did not consider all relevant portions of the record with respect to that matter.

4 NEED FOR THE PROJECT

4.1 Views of the Applicant

Petro-Canada submitted that although oil and gas exploration had taken place in the Sullivan Field for several years, no production had occurred to date because the necessary infrastructure to produce and transport the gas did not exist. It explained that the proposed Project was required in order to develop the Sullivan Field.

Petro-Canada stated that the Sullivan Field was a natural and logical extension of its operations in the Alberta Foothills area. Based on its experience with the Savanna Creek Field, it estimated the life of the Sullivan Field to be up to forty years, with a resource recovery of over 125 billion cubic feet of gas.

4.2 Views of the Interveners

4.2.1 The Big Loop Group

The Big Loop Group submitted that the Board should rule on the proposed trunk line application separately from the other applications submitted for the Project. The Big Loop Group noted that if the Board declined any of the other applications, there would be no need for the proposed trunk line. However, if the Board were to approve all of the other applications, the Big Loop Group questioned the need to route the proposed trunk line through the headwaters region. The Big Loop Group defined the headwaters region as the region encompassed by Highway 541 on the north, Highway 532 on the south, and the first range of mountains on the west, with the east boundary loosely defined by the grassland areas east of the trunk line.

The Big Loop Group submitted that approval of the proposed trunk line through the headwaters region would be diametrically contrary to the public interest and would not meet the policy objectives for watershed management and environmental protection in the long term.

4.2.2 The Stoney Nakoda Nation

The Stoney Nakoda Nation questioned the need for the Project, particularly the pipeline portion along the proposed Eden Valley route. It argued that if there was no need for the Project, taking up the lands required for the Project would constitute bad faith. It pointed out that even if approval were granted by the Board, there would be no project if land tenures required for the Project were not granted by Alberta Sustainable Resource Development (SRD).

The Stoney Nakoda Nation's argument regarding the need for the Project referred primarily to constitutional arguments discussed in Section 10 of this report.

4.3 Findings of the Board

The Board notes that the interveners questioned the need for the Project, particularly the trunk line, but did not dispute Petro-Canada's need to access and produce the minerals for which it had acquired the rights. The Board accepts that Petro-Canada has the necessary mineral rights to access the resources for the proposed wells. The Board is of the view that the proposed wells are necessary to recover and produce the gas reserves, provided the development can be carried out with appropriate environmental controls and in a manner that protects public safety.

The Board notes that while the interveners questioned the routing of the trunk line, they did not dispute Petro-Canada's need to gather and transport the sour gas production. The Board accepts the need for the pipelines to gather production gas from the wells to the central facility and to transport the gas to sour gas processing facilities.

The Board holds that while the interveners questioned the proposed location for the central facility, they did not dispute the need for a processing facility. The Board is of the view that there is a need for a central processing facility to dehydrate and compress the gas.

Upon consideration of the evidence presented above, the Board is satisfied that there is a need for the proposed Project in order to develop the Sullivan Field.

5 CONSULTATION

5.1 Views of the Applicant

Petro-Canada said that it carried out an extensive and comprehensive stakeholder consultation program with respect to its Project. It also indicated that its program exceeded the ERCB's consultation requirements in *Directive 056: Energy Development Applications and Schedules*. Petro-Canada stated that it planned its consultation program with two prime objectives of inclusiveness and transparency, began the program in early 2005, and had every intention of continuing it in the future.

According to Petro-Canada, its program included consultation on issues relating to all phases and components of the Project. This included one-on-one meetings, open houses, site visits, and group discussions. Another tool used was a Web-based system that tracked stakeholder and consultation activity logs, which could be readily retrieved for reference or regulatory compliance. Petro-Canada included the following stakeholders in its consultation activities: local ranchers, grazing lease and allotment holders, First Nations, trappers, timber rights holders, municipal government agencies, provincial government agencies, federal government agencies, regulators, regional villages and towns, nongovernmental agencies, recreational groups, and outfitters.

Petro-Canada stated that it gave careful consideration to feedback received throughout the program, which resulted in clarification and/or resolution of such issues as well site location, right-of-way (ROW) routing, and design changes.

Petro-Canada stated that it maintained an electronic contact recording and tracking system that required company representatives to document concerns and to ensure appropriate follow-up of commitments. Petro-Canada believed that the program was successful and claimed that this conclusion was supported by the limited number of formal objections and minimal participation in the hearing by stakeholders who had active interest in the lands involved.

Petro-Canada also stated that it had dedicated aboriginal affairs personnel to engage the Stoney Nakoda Nation at the Eden Valley Reserve, as well as the Piikani, Tsuu T'ina, and Siksika Nations. It further maintained that consultation with these First Nations remained ongoing and that in addition to First Nations consultation, it had funded cultural assessment overviews, which were conducted by the First Nations to inform the Project team of potential culturally significant sites in the Project area.

In addition to consultation pursuant to *Directive 056*, Petro-Canada indicated that it undertook an extensive consultation program in accordance with *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry*. Petro-Canada contended that it met all the public safety consultation requirements in *Directive 071*.

Petro-Canada acknowledged that Adderson expressed concern that there was no face-to-face consultation with it about changes made to the emergency response plan (ERP). Petro-Canada said that it had contacted Adderson directly during its initial ERP consultation and that face-to-face consultation did occur when the ERP was originally written, in accordance with the 2005 edition of *Directive 071*. Petro-Canada agreed that no face-to-face meeting occurred with Adderson when it was required by the Board to revise its ERP to reflect the new *Directive 071*

requirements in the 2008 edition. However, Petro-Canada noted that it outlined the changes to the ERP in subsequent information updates, which it provided to Adderson. Petro-Canada also provided contact numbers to Adderson if it had any questions about the ERP.

Petro-Canada indicated that it held several open houses with residents of the Eden Valley Reserve about its ERP. In addition, Petro-Canada said that it addressed any potential language barriers by having a Stoney liaison person present during the face-to-face consultation visits on the reserve about emergency response planning. Petro-Canada indicated that it committed to providing portions of the ERP in the Stoney language to help residents understand emergency response actions in the ERP. It stated that by the time the hearing started, this commitment had already been met.

5.2 Views of the Interveners

5.2.1 Adderson

Adderson stated that Petro-Canada did not meet the public consultation requirements under *Directive 071.* Adderson acknowledged that representatives from Petro-Canada did meet with it face to face. However, it noted that throughout the course of the face-to-face meeting, no specific ERP matters were discussed. Adderson stated that the consultation only informed it that its property was located within the EPZ and that it would be given instructions by Petro-Canada if an emergency were to occur.

5.2.2 The Big Loop Group

The Big Loop Group argued that while Petro-Canada conducted a public communication process, it did not meet the public consultation requirements of *Directive 056* because it did not engage the public on the question of alternative routes for the proposed trunk line, but instead made its own decision that the trunk line would traverse the headwaters region. The Big Loop Group stated that Petro-Canada presented the Project to the stakeholders without allowing them to become involved in that critical component of the decision-making process. Furthermore, it contended that Petro-Canada failed to provide evidence of the suitability of the proposed trunk line route by neglecting to provide a reasonable analysis and EA of any alternative routes.

The Big Loop Group also stated that in its view, *Informational Letter (IL) 93-09: Oil and Gas Developments Eastern Slopes (Southern Portion)* was important in that it provided for more onerous public consultation. It submitted that the unresolved issues considered at the hearing were substantially caused by Petro-Canada's approach to the applied-for route of the trunk line.

5.2.3 Stoney Nakoda Nation

The Stoney Nakoda Nation argued that the Project would be located on its traditional lands. It submitted that Petro-Canada was aware of the Stoney Nakoda Nation's constitutionally protected rights in the area of the proposed Project and that consultation with the Stoney Nakoda Nation was required by law. Furthermore, it stated that Petro-Canada demonstrated this awareness because it did not meaningfully engage any other First Nation, or any other intervener, to the extent that it engaged the Stoney Nakoda Nation.

The Stoney Nakoda Nation's position was that the ERCB was obliged to consider whether the Crown itself had discharged its duty to consult with the First Nations.

5.3 Findings of the Board

Directive 056 includes requirements to ensure that an applicant fully discloses its project to interested and potentially adversely affected parties. In doing so, it is the Board's intent to ensure that parties are given an opportunity to understand the proposed Project, identify and discuss concerns, and identify areas of difference for which they might be unable to find suitable solutions. This process provides an opportunity for the applicant to build relationships with landowners and other affected parties and to possibly accommodate their interests by agreeing to measures that may very well go beyond the requirements of *Directive 056*. This, in turn, may assist in building trust and constructive future relationships between an operator and stakeholders.

The ERCB developed *IL 93-09* to confirm to all oil and gas operators the information required in applications for developments along the southern portions of Alberta's Eastern Slopes. Proponents of energy developments in this region are expected to have early and open consultation with interested parties to identify stakeholders, specific issues, baseline environmental data, and further data requirements and to attempt to resolve as many issues as possible. The Board is of the opinion that due to the sensitivity of the area, applicants may need to go beyond the normal consultation process.

The Board believes that with respect to the applied-for Project, Petro-Canada conducted a thorough and accessible public consultation program that met the intent of *Directive 056* and *IL 93-09*. The program included ample opportunities for stakeholders to obtain information, express concerns, and have input to the Project.

It appears to the Board that Petro-Canada's strong views that the applied-for Project was superior led to a lack of consultation about the alternatives. Petro-Canada stated that there were "show-stoppers" on some of the alternative pipeline routes, for example, the Mazeppa alternatives (see Section 6). The Board recognizes that in light of the serious impediments that Petro-Canada saw in the alternatives, it was not prepared to pursue them. The Board believes that consultation involving alternatives to the option preferred by the applicant would have been helpful by providing information to the stakeholders about the options, including the reasons that Petro-Canada rejected them, and by providing information to Petro-Canada about the stakeholders' views on the options. Instead, that exchange was left to the hearing. While such consultation may not have resolved issues about the options, the Board believes that it may have clarified the issues and made the hearing more efficient.

Although the Board notes that Petro-Canada provided Adderson with written information about the changes it made to its ERP, the Board believes that Petro-Canada could have attempted more consultation on a face-to-face basis with him about the changes. The Board notes that Petro-Canada provided Adderson with the means to follow up with Petro-Canada on any questions or concerns that it had, but that it chose not to do so.

The Board believes that Petro-Canada made extensive efforts at consultation with the Stoney Nakoda Nation. The Board is of the view that the consultation requirements applicable to Petro-Canada are those contained in the ERCB's governing legislation, *Directive 056* and *Directive*

071 and that Petro-Canada has met those requirements. Section 10 of this report deals with a related matter, the issue of Stoney Nakoda Nation's notice of constitutional question.

The Board recognizes that further consultation will need to occur respecting the details of the ERP.

6 ROUTE AND SITE SELECTION

6.1 Wells and Gathering System Site Selection

6.1.1 Views of the Applicant

Petro-Canada submitted that it reviewed potential site and routing options at a high level, resulting in a fulsome application in which it reviewed a full range of considerations. Petro-Canada stated that its route and site selection process began by first seeking feasible locations. When it identified obstacles that could not be overcome, it excluded the route or site option from further assessment. Petro-Canada stated that once it determined its preferred route and site locations, it conducted a full EA covering a wide range of concerns to evaluate the potential impacts of its proposed pipelines, well sites, and central facility location.

Petro-Canada argued that route and site selection required the weighting and balancing of all relevant criteria. It stated that the guiding principles and design evaluation criteria that influenced its route and site selection process included

- the need to ensure safety in all phases of the Project,
- the mitigation of stakeholder and regulator concerns,
- the avoidance of areas with major terrain constraints,
- the minimization of disturbance to key wildlife habitat, aquatic resources, and native grasslands,
- the minimization of new disturbances,
- the use of existing roads, disturbances, and common corridors, and
- the avoidance of new access points from public highways.

In support of its applications, Petro-Canada filed separate routing/site location reports for the gathering system, the central facility, and the trunk line. Petro-Canada confirmed that it completed its EA after it had chosen the preferred site locations and routes. (See Figure 1.)

Petro-Canada stated that it had obtained all of the applicable mineral surface leases (MSLs) and pipeline agreements (PLAs) required from SRD with the exception of one PLA for a 26.85 km segment of the proposed trunk line (11-8-17-4W5M to 12-5-15-3W5M).

Petro-Canada asserted that it made use of existing disturbances to the extent possible in order to minimize the gathering system footprint. In 2004, Petro-Canada obtained three-dimensional seismic information across the southern portion of the Sullivan Field. It drilled and tested two wells and recompleted two other wells to determine whether or not further development was viable. With the location of the bottomhole targets and the nature of the geological structures

determined, it was Petro-Canada's position that there were very few options available for well pad locations.

Petro-Canada argued that the tight nature of the gas reservoir in the Sullivan Field would require additional well locations other than the ones applied for if the field were developed using single-well vertical bores. Petro-Canada stated that it was committed to minimizing surface disturbance by proposing to drill multiple wells from a single pad wherever possible. This resulted in Petro-Canada's proposal for a total of eleven new wells to be drilled from three existing sites and two new proposed well site locations. Petro-Canada agreed that the three existing sites would have to be expanded in order to accommodate the proposed additional wells.

It was Petro-Canada's position that its efforts to reduce the overall footprint for the Project, while considering stakeholder concerns, were apparent from the relative lack of opposition to the gathering system. Indeed, Petro-Canada stressed that the interveners proposed no alternative location options that would result in less impact on the area. Other than the evidence regarding the Telegraph Trail (a trail that intersects portions of the 3-19 access road that Adderson contended was of historical value), Petro-Canada argued that there was no expert evidence given by interveners to challenge the site selection for the well sites and access roads of the gathering system. Petro-Canada submitted that it had not found any reference to the Telegraph Trail being a historical resource. Petro-Canada referred to the Alberta Culture and Community Spirit (ACCS) statement that "Given the nature of the trail, the lack of any structures or artifacts within the area being impacted, [and] the relatively small portion being impacted, there would be very little further that could be done to mitigate impacts." Petro-Canada viewed the Telegraph Trail as an existing disturbance and indicated that the Project would impact 1.41 km of the trail.

6.1.2 Views of the Interveners

6.1.2.1 Adderson

Adderson pointed out Petro-Canada's proposal to have access roads and pipeline infrastructure cross or parallel the Telegraph Trail. Adderson's position was that the Project would destroy the trail by turning portions of it into a 20 to 40 m ROW that would affect the trail's use by impacting wildlife and recreational activities and altering the historical meaning of the trail.

Adderson expressed concerns regarding the use of existing sites in environmentally sensitive areas. According to Adderson, one area of particular diversity is along Flat Creek, while another is on the hills above the 8-7 and 7-7 well pads on the ridges above the Highwood River.

Adderson was also concerned with the suitability of the 10-25 site from a wildlife habitat perspective.

6.1.3 Findings of the Board

The Board is of the view that the geology, topography, and other features in the area create limitations as to where well sites can be located. The Board notes that no alternative locations were brought forward by the interveners. The Board is satisfied that Petro-Canada has used existing access routes and well pads where possible to minimize the footprint of the gathering system.

The Board notes that portions of the gathering system cross or run alongside the Telegraph Trail and the Board understands Adderson's concerns with respect to those crossings. However, the Board notes that the Telegraph Trail has not been designated as an historical resource by ACCS and that, based on its correspondence, it does not appear to have concerns about the crossings.

The Board finds that the applied-for wells and associated gathering system meet all ERCB regulatory requirements.

6.2 Central Facility Site Selection

6.2.1 Views of the Applicant

Petro-Canada stated that it initially considered two potential sites for the central facility: Option 1 located at NW-08-017-04W5M and Option 2 located at NE-17-017-04W5M. Following consultation with regulators and local land-users, it evaluated three additional sites. The criteria Petro-Canada examined to determine the proposed location included: road length, access management, vegetation, elk and grizzly bear habitat, ground and surface water, construction issues, noise, visibility, and input from stakeholders. Petro-Canada stated that it was faced with conflicting advice and competing interests from regulators and local land-users regarding the central facility location and believed that the selection of Option 1 achieved the best balance of all variables considered. Petro-Canada indicated that it had consulted with SRD, which had indicated that it wanted to keep the central facility as far south and as close to Highway 541 as possible, while Adderson wanted it located as far north as possible. Petro-Canada was of the opinion that the proposed location provides an appropriate balance between environmental considerations and other concerns.

Petro-Canada argued that Option 1 would result in

- a short distance of field access,
- a lower level of disturbance to wildlife,
- a lower level of disturbance to other land-users in the area, and
- minimal visual impact.

In addition, Petro-Canada argued that Option 1 was preferred by SRD. In particular, SRD preferred Option 1 over Option 2 from wildlife, fisheries, forestry, and public land-use impact perspectives.

Petro-Canada stated that Option 1 is on the edge of an integrated resource plan (IRP) critical wildlife zone (Zone 2), while Option 2 is in the multiple use zone (Zone 5). The initial route and site evaluation report indicated that elk habitat at Option 1 is rated as low to moderate for winter and low for summer habitat. Option 2 is in an area rated as moderate to high for winter and moderate to high for summer habitat, and it is also located in a wildlife corridor. However, based on revised wildlife habitat modelling provided in Petro-Canada's EA, it concluded that there is no difference between Options 1 and 2.

Regarding both elk and grizzly bear habitat, Petro-Canada's position was that habitat must be considered within the context of the surrounding area. It stated that when habitat is part of the equation, Option 1 was preferred regardless of habitat model output. The overriding principle

was to locate the facility as far south as possible to reduce the impact of daily traffic associated with the facility on wildlife use of habitats in the area. Petro-Canada indicated that (in terms of impacts on wildlife) the actual site conditions are not that much different from each other. However, Option 2 is about 1.6 km farther from Highway 541 than Option 1.

Petro-Canada argued that a 12 to 15 m wide road with occasional travel does not become an ecological barrier to wildlife in this area. Traffic to the central facility would consist of three to four vehicles per day. At the adjacent wells at which supervisory control and data acquisition (SCADA) would be used, vehicle traffic would be limited to about one vehicle per week. It maintained that the way wildlife use the area in question is through the overall connectivity of the area and that they adapt and move accordingly. Therefore, the area does not provide habitat connectivity through a series of fixed wildlife corridors.

Petro-Canada explained that Option 2 would result in the facility being located between Deep Creek and one of its tributaries. According to Petro-Canada, there is a reasonable chance that Deep Creek may contain genetically pure westslope cutthroat trout due to the presence of the two waterfalls between the Option 2 location and the Highwood River. Petro-Canada argued that it would have to truck produced sour water across the tributary to Deep Creek, increasing the chance of an accident that could impact the westslope cutthroat trout. Therefore, it was Petro-Canada's position that the risk of impact from sour water spills would be higher at Option 2 than Option 1. Petro-Canada indicated that it was advised by an SRD fishery biologist to avoid the Option 2 area. Regarding terrain, Petro-Canada believed that Option 2 was somewhat more favorable than Option 1 because it would not require as much cut and fill.

Petro-Canada stated that intervener concerns about the risk of groundwater contamination from the central facility could be managed through mitigation measures, including secondary containment and the installation of monitoring wells. (This is discussed further in Section 8.3: Groundwater – Adderson Spring.)

Petro-Canada did not comment on the feasibility of putting a central facility on the Highway 541/940 route. It took the position that this route was not feasible and therefore it did not undertake an evaluation to look at the implications of locating the central facility on that route.

Petro-Canada conducted a noise impact assessment (NIA) to establish and assess noise impacts from the central facility at each of the five potential sites. Noise impacts will be dealt with in Section 8.8.

From a visibility perspective, Petro-Canada stated that the flare stack would not be visible from Highway 941 at Option 2 but would be at Option 1. However, Petro-Canada maintained that the visibility of the flare stack at Option 1 could be reduced by painting it an appropriate colour, thereby reducing the visual impact. The pilot light could be shrouded to ensure that it would not be visible under normal working operations.

6.2.2 Views of the Interveners

6.2.2.1 Adderson

One of Adderson's greatest concerns was the proximity of the proposed central facility to the Adderson ranch. Adderson stated that if the central facility had to be built, it would prefer it be

located as far away from the Adderson ranch as possible (Option 2). However, in Adderson's view, any location for the central facility north of Highway 541 would be undesirable. It stated that Petro-Canada should locate the facility further west to the site of a former ranger station.

Adderson argued that Option 1 would result in the central facility being located within a critical wildlife zone while Option 2 would not. One of its witnesses, Dr. Bruce Leeson, an EA and wildlife expert, stated that Option 1 is located in an exceptional elk rutting area and that it provides exceptional year round habitat for moose and white-tailed deer, and summer habitat for bears. Adderson submitted that Option 1 ought to have been indicated as an elk movement corridor and that it would require greater cut and fill during construction to level the site, resulting in a larger surface disturbance. Adderson was also concerned that it would have a greater auditory and visual impact on the Adderson family.

Adderson pointed out that the criteria Petro-Canada used to justify its applied-for Option 1 location pertained to the building of the 3-19 access road. It was of the view that because this new road would also pass the Option 2 location, the only real advantage of Option 1 would be that Petro-Canada's daily traffic would be able to travel a shorter distance.

Adderson confirmed that the current non-producing status of the existing wells resulted in light traffic use on the existing access road, but contended that the proposed Project would cause an increase in traffic in the area. Petro-Canada predicted an increase of three to four pickup trucks per day in addition to a large tanker truck travelling to the central facility every seven to ten days for maintenance and sour water disposal. Adderson submitted this would be a significant increase in traffic that would create noise, dust, and incremental risk to the Adderson ranch. It also argued that the increased traffic would create more curiosity and entice other non-Project related traffic on and around the Adderson lands.

Adderson was concerned that the noise impact from the central facility would be greater at the Adderson residence from Option 1 than from Option 2 and noted the initial NIA's recommendations for mitigative measures to further reduce the noise impact. It also pointed out that the addendum indicated an increase in noise impact for Option 1 from the initial NIA and requested that Petro-Canada commit to implementing the noise mitigating recommendations contained therein.

6.2.3 Findings of the Board

The Board notes that the focus of Adderson's argument centered on the differences between the location sites proposed as Option 1 and Option 2, and that Adderson was opposed to Option 1. It is also aware that Petro-Canada evaluated five potential central facility locations. It appears to the Board that, of the options presented, Option 1 was preferred by SRD. This was supported by SRD's issuance of the surface disposition for the facility. Therefore, the Board is satisfied that effects on wildlife and fish are acceptable to the agency responsible for management of those resources.

The Board recognizes Adderson's concerns about increased levels of traffic and the potential impacts that this may cause. However, the Board notes that with either Option 1 or Option 2, the access route to the facility would follow the same access road. The Board is also aware of Petro-Canada's commitments specific to this issue; namely, the company has agreed to obey posted

speed limits, use safe vehicle practices on all field access roads, and employ dust control measures. As such, the Board finds the applied-for central facility location to be acceptable.

The issue of noise is dealt with in Section 8.8.

6.3 Trunk Line Route Selection

Petro-Canada and the interveners discussed and analyzed various routing options with respect to the trunk line portion of the proposed Project. The options discussed in this decision report will be referred to as

- the Eden Valley route (the applied-for route),
- the 541/940 route,
- the Pekisko route, and
- the Mazeppa route.

Petro-Canada developed detailed routing for the Eden Valley and 541/940 routes only.

6.3.1 Views of the Applicant

Petro-Canada stated that, in its initial planning stages, it considered four options for processing its gas:

- building its own gas processing plant,
- sending the gas to the Imperial Oil Resources (Imperial) Quirk Creek plant to the north,
- sending the gas to the Mazeppa Processing Partnership (MPP) Mazeppa plant to the east, and
- sending the gas to the Devon Coleman plant to the south.

Petro-Canada stated that it ruled out the option of building its own gas processing plant due to proliferation concerns, and rejected the Quirk Creek option for reasons related to lack of foreseeable capacity, rough terrain, and the presence of parks and protected areas along potential pipeline corridors. Petro-Canada stated that it evaluated several potential corridors for the trunk line to both the Mazeppa and the Coleman plants.

In considering the Mazeppa option, while Petro-Canada acknowledged there were various potential alignments that would terminate at the Mazeppa facility, these would involve a greater number of residents and urban centres as compared to the Coleman option. In considering potential alignments to Mazeppa, Petro-Canada determined that several residences could be within 100 m of the pipeline, thus violating the ERCB's setback requirements. Petro-Canada also stated that easterly routes towards the Mazeppa facility could result in the placement of a Level 3 sour gas pipeline in proximity to a higher number of population density developments such as Longview, High River, Cayley, and Nanton. If an incident were to occur along a segment of the trunk line, Petro-Canada concluded that any emergency response procedures for any Mazeppa routes would potentially impact more residences than the applied-for Eden Valley route.

Petro-Canada criticized the Big Loop Group's option for routing a pipeline to Mazeppa, pointing out that its witness who had designed the option had never designed a pipeline route and did not

receive any input from pipeline construction experts, landscape planning specialists, or environmental scientists. Petro-Canada argued that the potential impacts on native vegetation and grasslands, the best practice setback distance from the Highwood River basin, how to resolve the routing challenges around the OH Heritage Rangeland, and emergency response planning and public safety issues and procedures were not considered in an appropriate manner, or at all, in the Big Loop Group's Mazeppa option.

In comparison to other routing options, Petro-Canada submitted that the length of a pipeline from the proposed central facility to the existing Savanna compressor site at LSD 5-11-14-4W5M would be 39.6 km. From the compressor, the gas would be transported in an existing pipeline to the Coleman plant. Petro-Canada further submitted that constructing a pipeline to Mazeppa would result in at least 81 km of new disturbance.

In addition to new disturbance, Petro-Canada stated that a route to Mazeppa would require traversing a large area of unique and highly valued native fescue grassland, which it saw as prohibitive. Although Petro-Canada submitted that the use of fescue plugs for reclamation of native fescue would be appropriate for smaller areas, it was not convinced that plugs would be successful for a large area of fescue such as the one that would be encountered on a route to Mazeppa. Petro-Canada was of the view that it would be very difficult to realign a Mazeppa route to avoid the fescue grassland area.

Therefore, in summary, Petro-Canada chose to transport the gas south to the Coleman plant option, based on, among other things, the following key factors:

- the ROW required would be less than half of that required for the Mazeppa route,
- the Mazeppa option would potentially affect a significantly larger number of residents and landowners and require a more stringent level of pipeline classification,
- the pipeline ROW to the Mazeppa plant would likely cross a large, contiguous area of native fescue grassland,
- tying into the Savanna Creek field to the south would integrate well with Petro-Canada's existing operations, and
- the economics of tying into either plant were essentially equal when construction, gas debottlenecking, and operational costs were evaluated.

After selecting the Coleman plant as the best option, Petro-Canada stated that it considered six trunk line corridor options to route the pipeline south using three dimensional computer landscape simulations and taking into consideration topography, nearby residences, existing trails and seismic lines, surface water, IRP zoning, and provincially designated wildlife ranges. Petro-Canada submitted that its field work, which involved engineering, geotechnical, construction, public consultation, and EAs, helped it to narrow its corridor options down to three: the applied-for Eden Valley route, the 541/940 route, and the Pekisko Route. Petro-Canada stated that it also evaluated these options using available mapping and literature, previous experience and knowledge, and a detailed site exploration. Petro-Canada presented its comparison of the three south options in its March 2007 EA.

Petro-Canada indicated that the applied-for Eden Valley route met all ERCB regulatory and setback requirements. It stated that it asked the ERCB early in the developmental phase of the proposed Project if the Eden Valley Reserve would be designated as an urban centre. Petro-Canada indicated that it was advised by the ERCB that the Eden Valley Reserve did not meet the urban centre designation and as such, the 1.5 km Level 3 pipeline setback distance to urban centres would not be applicable. Petro-Canada stated that the Eden Valley Reserve would fall under the designation of an urban density development, as defined by *Directive 071*, and that it had met the regulatory setback requirement of this designation by proposing to construct its trunk line 320 m west of the boundary of the Eden Valley Reserve.

Petro-Canada concluded that the Eden Valley route offered the best balance of environmental, land use, constructability, operability, and public safety considerations. Petro-Canada indicated that it based its selection on the following:

- It affected fewer land users and residents and was located on Crown land.
- It was located on terrain suitable for pipeline construction.
- It was the shortest route and had a shorter length through designated wildlife ranges and IRP zones compared to the 541/940 route.
- It avoided large contiguous native grassland patches.
- It had the lowest visual impact.
- It made use of existing linear disturbances.
- It could be mitigated to reduce potential effects.

Petro-Canada stated that after it had selected the applied-for Eden Valley route, stakeholders continued to perceive that the 541/940 route would be more viable. In response, Petro-Canada took steps to reassess the 541/940 corridor by retaining TERA Environmental Consultants (TERA) to perform an independent, quantitative, spatial route evaluation. Petro-Canada confirmed that TERA considered nine routing constraint variables including public safety, reclamation, fisheries, constructability, wildlife, vegetation, land use, historical resources, and visual impact. Petro-Canada explained that to augment the TERA analysis, it completed a field reevaluation during a six-day, helicopter-supported, field scouting exercise in March 2008. The reevaluation team consisted of environmental, engineering, and construction personnel, who considered regulatory, constructability, environmental, and other factors. Petro-Canada submitted that this reevaluation supported its position that the Eden Valley route was preferable.

Petro-Canada indicated that it found the 541/940 route unacceptable primarily because of the severe terrain along Highway 541 in proximity to the Highwood River riparian area and the historical Sundance site. Petro-Canada maintained that, from an engineering perspective, the only practical routing option that would avoid construction in the riparian area would be to conduct a 2350 m horizontal direction drill (HDD) through the ridge alongside the Eyrie Gap. Petro-Canada argued that drilling through the Eyrie Gap, as well as bundling and pulling through two pipelines, would be a major technical challenge. Its position was that such an undertaking would involve significant risks, such as cave-ins that could damage the pipes and coatings, pipes

becoming stuck in the hole, and problematic access to any section of pipeline for repair or maintenance work. It also submitted that such an operation would require very large equipment and higher mud pressures, and that the only flat area large enough to accommodate the appropriate HDD equipment required for drilling would be in a significant archeological site and in the riparian area of the Highwood River. According to Petro-Canada, the actual HDD would also have to traverse under Don Getty Provincial Park, requiring Petro-Canada to obtain a surface disposition. Petro-Canada argued that such a surface disposition would be unlikely as new oil and gas dispositions are not granted within wildland provincial parks.

Petro-Canada indicated that the Highway 541 section of the route would be rocky and mountainous, with steep-sided hills and severe terrain, and that installing a pipeline through this area would require rock blasting, slope stabilization, and bio-engineering. It explained that these construction techniques would create hazards for workers, as well as increase the risks, as the remoteness and topography of the land would make any emergency response to the area problematic.

Furthermore, Petro-Canada indicated that the Highway 940 portion of the route runs through critical wildlife habitat (Zone 2) all along the south-facing slopes above the Highwood River. This area is critically important to wildlife. Petro-Canada submitted that construction through this area would require blasting in sheep habitat winter range. Petro-Canada believed that the Eden Valley route afforded the greatest ability to control access onto the ROW, and that this was important in terms of mitigating effects relating to habitat avoidance and increased risk of mortality to wildlife.

Petro-Canada indicated that compared to the Eden Valley route, the 541/940 route would require a similar number of temporary bridges during pipeline construction, and that it would leave a visible scar along Highway 541 upon completion of the Project.

With respect to the interveners' assertion that the 541/940 route could be constructed without requiring an HDD through the Eyrie Gap, Petro-Canada responded that none of the interveners presented any evidence to show that a viable contingency plan existed should the drill be unsuccessful.

Petro-Canada also adduced evidence to refute the interveners' contention that any proposed pipeline could parallel Highway 940 and hence use an existing disturbance. Petro-Canada's evidence was that the regulatory setbacks and the surrounding topography would prevent a direct paralleling of the highway for the entire length of the pipeline. It also noted that such a routing would require setback relaxation approval from the Alberta Government and that such relaxations are not guaranteed. Petro-Canada noted that while Highway 940 is a provincial highway, it is closed yearly from approximately December to June. Therefore, it is not maintained or cleared during winter weather which would limit access and monitoring capability in the portion that would fall behind the locked gates.

Petro-Canada argued that Mr. Curtis Bartlet and Mr. John Hermanson (witnesses for the Big Loop Group) were not experts who could speak to the viability of the 541/940 route, as neither had the necessary experience or qualifications.

In summary, Petro-Canada's position was that any attempt to construct a pipeline either by HDD or conventional methods along the 541/940 route would be environmentally unacceptable and

extremely risky. It stated that the technical challenges and risks associated with drilling through the Eyrie Gap and the lack of a viable contingency plan should the drill be unsuccessful, would make pursuing this option irresponsible. It further stated that additional constraints with the 541/940 route included the following:

- unacceptable risks associated with the close proximity to and paralleling of the Highwood River for up to 10 km (and for portions within the flood plain directly connected with the Highwood River), and the potential for loss of drilling fluids into the Highwood River and Cataract Creek,
- the impacts on wildlife habitat (crossing 19.2 km of critical wildlife zone and 8.6 km of designated sheep-goat range),
- the increased exposure of the public to a sour gas pipeline due to the proximity of two major highways, 541 and 940, which service eight provincial campgrounds and day use areas,
- the presence of an important historic First Nations sacred site,
- the reclamation challenges and likelihood of a permanent visual disturbance to the natural landscape,
- an additional 10 km of disturbance compared to the Eden Valley route, and
- the severity of the sloped terrain, incised valleys and creeks, and braided creeks and channels.

Regarding the Pekisko route, Petro-Canada submitted that it would have been easily constructible, but that it would traverse large expanses of native fescue grassland. Petro-Canada believed that it was not in the interest of Albertans to cause further fragmentation of the grassland.

6.3.2 Views of the Interveners

6.3.2.1 The Big Loop Group

The Big Loop Group submitted that the evidence of Petro-Canada regarding route selection, environmental, and reclamation issues should be given little weight, as Petro-Canada's witnesses were not independent and therefore presented a biased point of view that did not consider a balancing of all interests. It argued that Petro-Canada had proposed a route that is in the best interests of the shareholders and management of Petro-Canada, but not in the best interest of Albertans.

The Big Loop Group argued that Petro-Canada did not conduct EAs for any of the alternative trunk line routes, and that as a result Petro-Canada made its determinations without having all of the necessary information. In particular, the Big Loop Group argued that Petro-Canada did not include a comparison of potential southern routes to potential eastern routes to Mazeppa and that there was no direct comparison of Mazeppa routes to the proposed Eden Valley route. The Big Loop Group argued that these factors meant that the Board did not have enough information to determine whether or not the proposed Project would be in the public interest and should deny

the application. Finally, the Big Loop Group submitted that, from its point of view, Petro-Canada was not open to any other route than the applied-for route.

The Big Loop Group argued that (based on the precautionary principle and avoidance as the first and best mitigation strategy) the entire Eden Valley trunk line route should be avoided. It submitted that the headwaters region would not be the place to experiment with any untested mitigation measures. Petro-Canada's proposed mitigations offered little comfort to the Big Loop Group that the impacts of its proposed Project could be successfully managed, evaluated, or ameliorated.

With respect to Petro-Canada's potential southern route options, the Big Loop Group submitted its own analysis based on some of the criteria from Petro-Canada's filed materials. It described its analysis as the best articulation of a reasonable comparison of the Eden Valley route to the 541/940 route based on 45 factors. The Big Loop Group said that only three out of Petro-Canada's 45 factors were useful for the purpose of comparing the alternative routes, 8 were deficient for comparison, 19 were listed in the EA but not used, and 15 were not listed in the EA. After its analysis, the Big Loop Group submitted that 32 out of the 45 criteria favoured the 541/940 route, 7 factors resulted in an equal score, and 6 factors did not have sufficient data to enable comparison.

Regarding the 541/940 route, the Big Loop Group pointed out in its submissions that Petro-Canada testified that it had not

- prepared a construction execution plan or detailed logistics information,
- completed any geotechnical work with respect to water course crossings,
- checked the specific access points,
- figured out any necessary HDD locations,
- completed a field assessment to determine the number of creek crossings,
- completed any fisheries assessments,
- completed a cultural assessment overview,
- completed an assessment of rare plants, wildlife issues, stream issues, or
- contemplated any mitigation of any those impacts or completed a vegetation study.

It was the Big Loop Group's conclusion that, given its opinion that the routing of the trunk line was the most important issue in relation to the Project, Petro-Canada did not comply with the Board's requirements. Furthermore, the Big Loop Group asserted that Petro-Canada failed to carry out thorough and detailed work that is required under *IL 93-09* for an application in the Eastern Slopes. It also asserted that Petro-Canada should have developed and considered a Mazeppa route for public and regulatory consultation in order to more fully understand the costs and benefits of each routing option.

The Big Loop Group submitted that the advantage of the 541/940 route was that it would be located in an area with more extensive industrial activity, including the Savanna Field, forestry activities, and camping and recreational uses. In addition, the 541/940 route would parallel an existing sour gas pipeline for 5.2 km north of the Petro-Canada's Savanna plant. The Big Loop Group submitted that Mr. Birkett and Mr. Hansen's conclusion regarding the inadvisability of an HDD crossing of the Eyrie Gap was erroneous and was made entirely without any scientific or factual basis. The Big Loop Group argued that the analysis was made without geotechnical information, without an adequate field survey, and without any true effort on Petro-Canada's part to carefully analyze the prospects of crossing the Eyrie Gap.

The Big Loop Group took the position that the addition of a pipeline along the 541/940 route would not have any noticeable incremental impact in the area due to the proximity and location of the highway. It argued that the 541/940 route, as described in the Birkett and Hansen report, traverses a number of logging cut-blocks and reforested cut-blocks, as industrial logging activity is actively pursued in this area. It also argued that the route followed old forestry roads wherever possible (where existing cut-blocks could not be followed) and that it was designed to avoid all campgrounds. It submitted the route also followed the existing Petro-Canada access road at LSD 10-36-14-5W5M, and subsequently would have tied into the existing Petro-Canada ROW located at LSD 11-19-14-4W5M. The Big Loop Group submitted that the southern portion of the Birkett and Hansen route complied with the Board's requirements for pipeline ROWs to follow existing pipeline ROWs, particularly when dealing with sour gas, while the proposed Eden Valley route did not.

The Big Loop Group submitted that Petro-Canada did not conduct a geotechnical analysis of the Eyrie Gap, and therefore did not gather the appropriate facts to be able to make a judgment on the feasibility of the 541/940 route.

With respect to potential routes to Mazeppa, the Big Loop Group was of the opinion that Petro-Canada purposely designed its Mazeppa routing options to traverse fescue grassland and residential areas in order to appear inferior. Furthermore, it submitted that an eastern route to the Mazeppa plant could be designed to avoid such areas. To support its contention, it provided evidence in the form of a report and witness testimony at the hearing from Longview Planning & Design, which completed a route assessment report. This report (the Beunder report) provided an alternative route to the Mazeppa plant.

The Big Loop Group submitted that a route to Mazeppa could follow existing disturbances such as Highway 541 and 20 per cent of the existing Plains Mid Stream Canada HVP line ROW. The Beunder report indicated that a pipeline could then proceed east through the predominately cultivated and sparsely populated lands, finally connecting with an existing sour gas pipeline south of Mazeppa which feeds into the plant. This would result in one half of the route being built on existing ROWs through land that is primarily cropland. As such, any setback restrictions on the land would be comparably minimal. The Big Loop Group submitted that such a route would allow for year-round access to all route segments, result in fewer watercourse crossings, and reduce impacts to fescue grasslands. In addition, the Big Loop Group submitted that, from a soils and terrain perspective, a route to Mazeppa would be the most constructible. It argued that while certain design assumptions were made in its analysis, they were not excessive and primarily concerned the installation of additional ESD valves in proximity to residences to

decrease the rating of the pipeline from a Level 3 to a Level 2 and limit any potential impact to area residents.

The Big Loop Group admitted that its route proposed to traverse through the OH Ranch Heritage Rangeland. However, it stated that this was suggested prior to the OH Ranch Heritage Rangeland receiving Heritage Rangeland status. To address the newly appointed status, the Big Loop Group suggested the possibility of Petro-Canada

- directionally drilling under the OH Ranch Heritage Rangeland,
- obtaining a waiver from the government, or
- planning a pipeline route around it.

The Big Loop Group criticized Petro-Canada for failing to evaluate the possibility of constructing a pipeline through the OH Ranch Heritage Rangeland in consultation with SRD. Furthermore, the Big Loop Group stressed that its potential route to the Mazeppa plant could be used as a starting point to evaluate potential alternative routes.

The Big Loop Group was of the view that there are many factors that Petro-Canada needs to consider when attempting to make decisions on the routing of the trunk line. It argued that route selection is dependent on the set of criteria established for evaluating the various proposed routes. It submitted that pipeline construction projects are very complicated and should contain a consideration of many different routing factors. Finally, it stressed that the onus for comparing such routes lies with the applicant and not the interveners.

The Big Loop Group argued that the Board needs to focus on the factors that Petro-Canada used for choosing its proposed pipeline route, the relative weightings given, and how the routes were compared.

6.3.2.2 The Stoney Nakoda Nation

The Stoney Nakoda Nation agreed with the submissions of the Big Loop Group, stressing that the proposed route would not be favorable.

The Stoney Nakoda Nation submitted that a route to the Mazeppa plant could follow existing disturbed areas east from the Sullivan Field along Highway 541 and would not further disturb natural and sensitive areas. Further, it pointed out that the terrain east from the gathering system toward the Mazeppa plant is comprised of light to medium rolling terrain, in contrast to the comparatively rough and difficult environment found along the proposed Eden Valley route.

The Stoney Nakoda Nation submitted that the existing mineral leases in the OH Ranch Heritage Rangeland would be honoured and therefore a pipeline crossing of the ranch should not be excluded automatically.

The Stoney Nakoda Nation pointed out that Petro-Canada scored the 541/940 and Eden Valley routes equally in terms of public and private land, since no privately held land would be encountered on either route. It contended that Petro-Canada ignored the proximity of the Eden Valley Reserve to the Eden Valley route in its scoring. It argued that Petro-Canada adequately cross-analyzed only three factors in its comparison analysis: residences and public facilities, public and private land, and grazing. Therefore, it submitted that since Petro-Canada had not

completed a balanced study due to the lack of comparison of the other factors listed in the EA, conclusions could not be drawn as to the suitability of one route over another.

The Stoney Nakoda Nation contended that the applied-for Eden Valley route was in violation of the ERCB setback requirements for a Level 3 pipeline. It indicated that Eden Valley Reserve did meet the "urban centre" designation in *Directive 071*, and that therefore the setback distance for the applied-for pipeline to the Eden Valley Reserve would be 1.5 km. As the applied-for trunk line route is approximately 400 m from the boundary of the Eden Valley Reserve, it argued that the application violated ERCB setback regulations and, therefore, should be denied.

The Stoney Nakoda Nation submitted that from an overall environmental and cultural consideration, the 541/940 route would be more favorable. It argued that the 541/940 routing area is already heavily disturbed and would result in little additional landscape fragmentation.

6.3.2.3 The Pekisko Group

The Pekisko Group submitted there would be more effects relative to the watershed along the Eden Valley route than along the 541/940 route. It presented Mr. Gordon Cartwright's photographs to show that the 541/940 route, unlike the proposed route, contained numerous existing disturbances. It expressed concern about the rollbacks that Petro-Canada would put on the pipeline ROW, erosion in the vicinity of the ROW, and traffic issues (which will be discussed in greater detail in Section 8.6: Access Management).

Furthermore, its position was that Petro-Canada had not provided the Board with sufficient data to establish that the 541/940 route was not feasible. The Pekisko Group also submitted there were a variety of possible routings through the Eyrie Gap area, with or possibly without a horizontal drill. Finally, the Pekisko Group argued that Petro-Canada's failure to more thoroughly consider and analyze the 541/940 route should result in the denial of its application.

6.3.3 Findings of the Board

The Board expects applicants to consider more than one route option where circumstances warrant during the initial project design and planning stages of a project in order to find an appropriate and thorough balance of interests in the selection of a preferred route. To what extent each route is to be considered by applicants will vary with the particular circumstances and facts of each application. In that vein, the Board encourages applicants to consider alternative routes thoroughly before making their applications to the Board and to provide the Board with this information in their applications. Notwithstanding, it is important to note that applicants are not required to show that their applied-for or preferred routes are superior to any possible alternative routes.

The Board must be satisfied that the applied-for trunk line can be constructed by Petro-Canada in a manner that is safe and meets all ERCB regulatory requirements, does not have unacceptable impacts on local residents, the environment, or traditional and recreational uses of the land, and takes into consideration the unique nature of the area, specifically with respect to *IL 93-09*.

The Board has considered Petro-Canada's analysis with respect to its options for the processing of its gas reserves. The Board agrees with Petro-Canada that it would be undesirable to locate a large new sour gas processing facility in the area of the Sullivan gas reserves. The Board is also

satisfied that the Quirk Creek processing option presents serious difficulties, given the length of the route, challenging topography, and a lack of plant capacity. The Board notes that interveners did not take issue with these positions. The Board notes that Petro-Canada regarded the Mazeppa plant as a viable processing option in terms of constructability and cost, but rejected this option early in its analysis. Petro-Canada had serious concerns about the amount of urban and rural development along the potential pipeline corridors to take the gas to the Mazeppa plant, the overall greater length of these corridors, and the potential conflict with native fescue grasslands. On the basis of all the evidence, the Board is satisfied that Petro-Canada undertook a thorough consideration of its processing options in selecting its applied-for option, namely, the Coleman plant option.

With regard to the trunk line, Petro-Canada considered the four routes listed in Section 6.3.1: the Eden Valley route, the Pekisko route, the 541/940 route, and the Mazeppa options. It identified "show stoppers" or issues it considered to be unacceptable to it in three of the four options and selected the Eden Valley route as its preferred and applied-for route.

The Board notes that in the main, interveners did not argue or take the position that the Pekisko route was a viable alternative. Petro-Canada gave evidence that it rejected the route early in its planning and design stages. The Board is of the view that neither Petro-Canada nor the interveners seriously considered the Pekisko route as an option due to a variety of unacceptable impacts and constraints, and as such, the Board does not consider it to be preferable to the applied-for route.

The Board notes that interveners argued that the Eden Valley route was not acceptable for a variety of reasons, the Mazeppa and 541/940 routes were in fact viable, if not better, options, and an alternative route to Mazeppa proposed by the Big Loop Group was also a viable option.

Regarding the Mazeppa route, the Board notes that Petro-Canada considered several easterly routes to the Mazeppa plant in its "Sullivan Infrastructure Project Route Evaluation Report Trunk Line (East Option)," submitted as part of its applications. It divided the route into three segments, one with three options and two with four options. It ultimately rejected these options due primarily to the proximity of residences and expanding residential and commercial development in the High River area and to the unavoidable impact of the routes on native grasslands.

The Board notes that the length of the Mazeppa routes could be from two to three times that of the applied-for route. The routes could traverse over 80 privately owned properties, be in close proximity to about 50 residences, and require more than 100 third-party crossings of existing oil, gas, and utility infrastructure. It also notes that construction activity and traffic management on the Mazeppa routes would have a greater impact than on the applied-for route and that the routes would likely result in public access management challenges, as new access roads and trails would need to be built on those routes.

The ERCB has regulated minimum setback distances for sour gas development to existing surface development and population density developments. The Board notes that ranchlands, heritage rangelands, and residential/commercial/industrial development in High River and High River Airport areas exist in proximity to the routes, thereby potentially creating impacts on future development in the area. In light of the evidence, the Board is of the view that the potential for land-use conflicts would be increased with the Mazeppa routes. Further, the Board

notes that the contributions to cumulative effects on the Mazeppa routes have been identified as those associated with visual effects, grasslands and native vegetation, heritage rangelands, and land use and that these routes likely present a greater number of potential contributions than the applied-for route.

The Board notes that the Mazeppa routes could potentially affect larger complexes of native grasslands than the applied-for route. It accepts Petro-Canada's evidence that it could not adequately mitigate the impacts of the Mazeppa routes on contiguous patches of native fescue grasslands and that while its reclamation technology has shown promise on areas less than 5 hectares in size, it has not been tried, much less proven, on large areas on the Mazeppa routes, such as the Pekisko grassland. Further, the Board accepts that the number of watercourse crossings on the Mazeppa routes east of the gathering system will be more difficult to reclaim and be subject to impacts from spring flood events.

The Board accepts that the length of the Mazeppa routes and the operating pressures at the Mazeppa plant would require a larger diameter pipeline than the one applied for and that additional compression could be required as a result, adding to the expense and complexity of the routes. The Board also notes that requirements for emergency shutdown valves on the Mazeppa routes would be greater than on the applied-for route and that the sites would also require a greater footprint, thereby adding to their impact.

The Board considered an alternative route to the Mazeppa plant proposed by the Big Loop Group which provided evidence from Kristi Beunder, a senior planner with Longview Planning and Design. She prepared a report entitled "Sullivan Field Route Assessment—Alternative Alignment to the Mazeppa Partnership Processing Facility" and gave evidence at the hearing. The Board notes that she was not asked to make any comparisons with or challenge the applied-for Eden Valley route in her analysis. The Board also notes that she had never designed a pipeline route, had not, in the preparation of her report, received any input from construction specialists, landscape planning specialists, or environmental scientists, and had not read any of Petro-Canada's application materials. She was also not aware of and did not consider potential impacts on native vegetation, grasslands and visual resources. She also did not address best practice setbacks from the Highwood River basin, the ERCB *Directive 071* ERP regulations, increasing country residential and industrial development in the region, the fact that the majority of the length of the route would cross private or deeded lands, the routing challenge posed by the OH Ranch Heritage Rangeland, and differing pipeline setback distances. No other evidence from other interveners was adduced to show that this alternative route to Mazeppa was viable.

In light of all of the evidence, the Board is of the view that the Mazeppa routes have significant challenges and associated potential impacts and that, as such, the Mazeppa routes are not preferable to the applied-for route. The Board has given the Beunder report and the evidence of Ms. Beunder little weight and is of the view that the alternative route to the Mazeppa plant put forward by the Big Loop Group is not a viable alternative route.

With regard to the 541/940 route, the Board notes that Petro-Canada found the route to be unacceptable primarily because of the severe terrain along Highway 541 in proximity to the Highwood River and the extreme difficulty in completing a 2350 m HDD through the ridge at Eyrie Gap. The Board also notes Petro-Canada's evidence that it considered additional route constraints, such as up to 10 km of the route being close to and parallelling the Highwood River

and the potential for loss of drilling fluids into the river and Cataract Creek, impacts on about 20 km of critical wildlife zoning and sheep/goat range, the proximity of highways, eight provincial campgrounds, and day-use areas, the presence of a historical First Nations sacred site, an additional 10 km of disturbance as compared to the applied-for route, and the severity of the terrain involved.

The Board also considered the arguments of interveners that the 541/940 route would have less impact on the area and would be a better option than the Eden Valley route from a number of perspectives. It considered the report submitted by Mr. Hermanson, a witness for the Big Loop Group, which concluded that based on a variety of factors, the 541/940 route was preferable to the Eden Valley route. Mr. Hermanson was a pipeline estimator whose company was not licensed to practice engineering, and he had never been involved in the construction of a pipeline with similar characteristics to the trunk line. In preparing his report, he undertook a desktop review of the feasibility of HDD on the 541/940 route and did not undertake any geotechnical review of the Eyrie Gap. Mr. Hermanson was not retained or qualified to express an expert opinion on the feasibility or constructability of pipeline routing or HDD options for the Project. In his report, he did not consider other factors or impediments to this route, nor did he consider the presence of wildlife zones, potential watershed and fisheries impacts, the presence of important historical sites, reclamation and visual considerations, public safety, setbacks, or the input of any other qualified professionals. Notably, he did not consider the 2350 m HDD with no contingency plan to be an obstacle in his evidence. Having regard for the above, the Board gives the Hermanson report and evidence little weight.

The Board is of the view that the comparison provided by the Big Loop Group of the Eden Valley route and the 541/940 route was simplistic, not objective, and prepared by a lay person, not an expert in the consideration of any of the 45 factors set out. The Board finds that the comparison was of no value to it.

In light of all of the evidence, the Board is of the view that the 541/940 route also has serious challenges and associated potential impacts and that, as such, it is not preferable to the applied-for route.

With regard to the Eden Valley route, it appears to the Board that Petro-Canada has developed a comprehensive analysis of the route, which considered several corridors for potential trunk lines to both the Mazeppa and Coleman plants. On the basis of all of the evidence, the Board finds that the Eden Valley route is preferable to the other two routes to the Coleman plant that Petro-Canada considered. The Board accepts that the Eden Valley route involves a total of 40 watercourse crossings, 24 of which are on the trunk line, and that the route meets all applicable regulatory setback requirements with regard to the Eden Valley Reserve.

The Board does not accept the arguments of the interveners that Petro-Canada should have completed a comprehensive EA on more than one route option. Petro-Canada evaluated a number of routes and selected a preferred route based on its evaluation of a variety of factors. On the basis of all of the evidence, the Board finds that Petro-Canada took a reasonable and balanced approach to route selection.

The Board is aware that it is extremely difficult to satisfy all persons involved when performing routing analyses and making choices based on their results. The Board finds that Petro-Canada

has addressed concerns from a wide variety of stakeholders and thoroughly assessed the route's constructability, impacts, and reclamation measures, among other things.

Based on all of the evidence, the Board is of the view that the Eden Valley route is the shortest, makes use of existing linear disturbances, is entirely on Crown land and does not require third-party crossings, makes use of a large portion of Petro-Canada's existing fuel gas pipeline ROW, avoids large contiguous grassland patches, is located on terrain suitable for the proposed pipeline construction methods, has a lower visual impact than the Mazeppa and 541/940 routes, would affect fewer land users and residents than the Mazeppa routes, has a shorter length through designated wildlife ranges and IRP zones than the 541/940 route, and has no impacts that cannot be adequately mitigated to reduce potential effects. Of the Mazeppa, 541/940, and Eden Valley routes, the Board finds that the Eden Valley route provides a preferable balance of conflicting demands and uses, taking into account all of the evidence. The Board is satisfied with the applied-for Eden Valley route.

7 PUBLIC SAFETY

7.1 Emergency Response Planning

To ensure public safety and to assist in the preparation for possible emergencies involving H_2S, the Board requires applicants to calculate EPZs and create an ERP based on the EPZ. Initially, Petro-Canada calculated the EPZs for the components of its Project using the nomograph calculation tool, as required by the Board at that time. On April 8, 2008, the ERCB released a new version of *Directive 071,* as well as a new EPZ calculation model, ERCBH2S. In *Decision 2008-029*, the Board directed Petro-Canada to amend its ERP to comply with the requirements in the 2008 edition of *Directive 071* and recalculate its EPZs using ERCBH2S Version 1.18, which was in effect at the time (see Figure 2). Some months later, the Board released ERCBH2S Version 1.19 for testing.

7.1.1 Views of the Applicant

Petro-Canada stated that safety was the cornerstone of its beliefs and core values and was its top priority. Petro-Canada noted that if the Project could not be completed and operated in a safe manner, it would not attempt the development. It stated that its ERP met or exceeded all applicable regulatory requirements and industry best practices.

Petro-Canada stated that the ERCB deemed its ERP technically complete in June 2008 with respect to the 2008 edition of *Directive 071*. Petro-Canada explained that, in accordance with the Board's direction in *Decision 2008-029*, it calculated the response zone distances for its Project using ERCBH2S Version 1.18, the applicable model at that time. Petro-Canada noted that the ERCB required Petro-Canada to confirm that the EPZ sizes met Version 1.19, which was released during the processing of the applications. Petro-Canada confirmed that using Version 1.19 resulted in no change to its EPZ sizes.

Petro-Canada stressed that its applications were in full compliance with all ERCB setback distance requirements. Petro-Canada stated that the ERCB advised it in March 2006 that the Eden Valley Reserve was not an urban centre and therefore did not require a 1.5 km setback. Petro-Canada stated that accordingly, the minimum setback distance required for its Level 3

trunk line to permanent dwellings on the reserve was 100 m. It noted that its trunk line would be located approximately 320 m west of the Eden Valley Reserve boundary, and approximately 500 m west of the closest permanent dwelling on the reserve. Given these distances, Petro-Canada declared that it had fully complied with ERCB setback requirements.

Petro-Canada noted that while the Eden Valley Reserve was not an urban centre for setback purposes, the ERCB would consider the Eden Valley Reserve as an urban density development which would result in the need for additional public safety measures being incorporated into the ERP. Petro-Canada noted that it had incorporated such additional measures for the Eden Valley Reserve.

Petro-Canada stated that the public protection measures outlined in its ERP were based on two approaches: "removing the H_2S from the public" and "removing the public from the H_2S."

Petro-Canada acknowledged that its proposed Project would be in an area that had high frequency of transitory use. To address the concerns expressed by the interveners over locating transients in cases of emergency, Petro-Canada stated that it created a separate ERP map showing the location of campgrounds, outdoor activity staging areas, and the boundaries of area grazing leases. Petro-Canada added that should an emergency occur, it could contact the local authority to determine any organized transient use in the area. It further noted that it had conducted extensive consultation with the Eden Valley Reserve pertaining to locations where Stoney Nakoda Nation members would engage in traditional land-use activities. Petro-Canada indicated that it would also attempt to educate transients about the Project by posting placards at access points indicating the potential presence of H_2S. These placards would clearly outline protective measures that persons should take if they detect H_2S odours. It further stated that it was willing to prepare brochures for people camping at the Indian Graves Campground, or other similar locations, that would allow for more access to information about the properties of H_2S and what to do if H_2S is encountered. Petro-Canada contended that all of these measures would assist in removing the public from the H_2S.

Petro-Canada emphasized that its employees would undergo extensive safety training, including H_2S and ERP awareness training. It added that its rovers would be trained on how to locate backcountry users in the area's rough terrain, and noted the possibility of using a helicopter to assist in the search for transients and backcountry users. Petro-Canada emphasized that these measures would also help remove the public from the H_2S. While Petro-Canada was confident in its ability to locate transients, it acknowledged that there would be no precise way of knowing whether or not people were in the area should an incident occur.

Petro-Canada recognized that all interveners expressed concerns over the low level of cell phone coverage within the Project area. This issue was of specific concern to the Stoney Nakoda Nation and Health Canada – First Nations and Inuit Health Branch on Public Safety and Health Issues (FNIHB-HC), the federal body responsible for overseeing public safety and health issues on reserves. Petro-Canada stated that it was willing to explore options such as the installation of a communications tower, sirens, or horns, on the reserve. Such a communication option could function as a warning system to the Eden Valley Reserve and surrounding residents of an emergency. It also indicated that its responders would be equipped with two-way radios to facilitate responder communications during an incident.

Petro-Canada stated that 14 rovers would be needed over the entire Project area to locate and assist in the evacuation of persons within the EPZ. It noted that eight rovers would be needed to address evacuation of the Eden Valley Reserve, should it be required. Petro-Canada indicated that it would commence evacuation of persons within the initial isolation zone at a Level 1 emergency, thereby removing the public from the H_2S. Petro-Canada contended that this exceeded *Directive 071* requirements, as evacuation is not a requirement at a Level 1 emergency. With respect to the Stoney Nakoda Nation's contention that it had not developed an evacuation plan for the Eden Valley Reserve, Petro-Canada said that the ERP included the evacuation plan. Contrary to the concern expressed by the Stoney Nakoda Nation about having only one egress route out of the Eden Valley Reserve, Petro-Canada noted that only one egress route is required during an emergency.

Petro-Canada said that its central facility would be staffed with two to four personnel during the daytime but would not be manned at night. Should additional personnel be required for emergency response, they would come from Petro-Canada's neighboring Wildcat Hills and Savanna Creek facilities (with response times ranging from 1 hour to 1 hour and 45 minutes). When questioned about the potential location of emergency response personnel for the Project, Petro-Canada indicated that it anticipated staff would reside in the area, potentially in Black Diamond or another community a similar distance away from the Project.

Petro-Canada stated that the ESD valves located on the trunk line would be set to alarm at H_2S readings of 10 parts per million (ppm), and to close at 20 ppm. Limiting the amount of H_2S within the pipeline segment by closure of the ESDs would assist in removing the H_2S from the public. Petro-Canada stated that it would suspend operation of the pipeline upon receiving even one odour complaint and would conduct an investigation on the source of the odour. For those segments near the Eden Valley Reserve, Petro-Canada stated that it would suspend operations and dispatch personnel to investigate upon receiving two odour complaints. It noted that an additional H_2S monitor would be located in close proximity to the Eden Valley Reserve for detection of any releases.

Petro-Canada stated that sheltering in place is an accepted, viable, short-term public protection measure. Petro-Canada acknowledged that both the Stoney Nakoda Nation and the FNIHB-HC submitted correspondence outlining concerns about the viability of sheltering in place with respect to its Project. To address this concern, Petro Canada committed to looking at the condition of residences in the Eden Valley Reserve to note the repairs that would be needed to improve the suitability of the houses for sheltering in place. This would include looking at the air tightness, and the ability for occupants to control thermostats in the homes. Petro-Canada stated that rooms suitable for sheltering in place would be identified in each Stoney Nakoda Nation residence. Petro-Canada would make modifications to ensure that at least one of the rooms was suitable for sheltering-in-place purposes. Petro-Canada further stated that it would carry out periodic reviews of the conditions of the homes or rooms for sheltering in place. It indicated to the Stoney Nakoda Nation that it was willing to accept these commitments as conditions of approval.

Petro-Canada stated that it would be willing to conduct emergency response exercises at the Eden Valley Reserve, with the participation of local residents. Petro-Canada committed to holding such an exercise prior to commencement of operations to test its response capabilities.

Petro-Canada also committed to holding an H_2S awareness training course on the Eden Valley Reserve.

Petro-Canada indicated that it was confident that its ERP would ensure public safety.

7.1.2 Views of the Interveners

7.1.2.1 Adderson

Adderson questioned the accuracy of Petro-Canada's EPZ calculation, the capability of Petro-Canada to protect the public should an emergency occur, and the methods Petro-Canada intended to employ to ensure the safety of transient and backcountry users.

It asserted that Petro-Canada developed the EPZ calculations using an outdated version of the ERCBH2S model. Adderson, as a result, questioned if the calculated EPZ size for the proposed development was accurate.

Adderson questioned Petro-Canada's capability to protect its staff and family. It indicated that at any given time, ranch employees or family members can be out in the yard, in the backcountry, or on Adderson-leased lands, all of which are away from telephone communication and in areas of limited cell coverage. It noted that Petro-Canada stated that between two to four personnel may be located at the central facility. These personnel would be available during the day only with no one readily available to deal with an emergency during the night. Adderson indicated that additional Petro-Canada emergency response manpower would come from other operations that were up to 1.5 hours away from the Project. Adderson also noted that during an incident, those two to four Petro-Canada staff members would be first occupied with managing the incident and would not be available to provide emergency response activities. Therefore, the safety of affected persons would have to wait until the additional resources arrived, by which time an H_2S plume could have already passed over Adderson's operations, staff, and family. Given the proximity of the Project to Adderson operations, the transitory nature of the employees' work, and the few and far away resources available, Adderson stated that he doubted that Petro-Canada could remove the public from the H_2S.

Adderson also indicated that for the H_2S monitoring system to detect a release, the wind would have to be blowing in the direction of the monitors installed along the trunk line. He questioned the likelihood of that happening, given the high variability of wind direction in the area. Adderson argued that even if the ESDs on the pipeline did detect a release and close as described by Petro-Canada or if the H_2S monitors picked up H_2S readings, Adderson land and workers downwind of the release would be affected by the plume before any emergency measures personnel could be dispatched as the operations were so close to portions of the trunk line. Hence, it contended that relying on "removing the H_2S from the public" was not a viable response philosophy.

Dr. Leeson indicated that there are many undesignated campsites and hunting camps in the area which are used sporadically during the year. He stated that when these camps are being used, several people can be found at any one location. He further added that there was poor cell phone coverage in some of these areas, and other areas had no coverage at all. Considering the challenges to communications and the nomadic nature of those using these camps, Adderson further questioned how Petro-Canada could guarantee the safety of the backcountry users.

Adderson also indicated its support for the designation of the Eden Valley Reserve as an urban centre.

7.1.2.2 Stoney Nakoda Nation

The Stoney Nakoda Nation argued that the ERP did not adequately address the safety of the Eden Valley Reserve residents, nor was the trunk line compliant with ERCB setback requirements. It also argued that the ERP may not be in compliance with *Directive 071* as Petro-Canada used an outdated version of the ERCBH2S model to determine the response zones. In its initial submission, the Stoney Nakoda Nation noted that Petro-Canada calculated the EPZs using ERCBH2S Version 1.18. It noted that this version of the model was subsequently replaced by Version 1.19. As such, the Stoney Nakoda Nation contended that Petro-Canada did not use the most current EPZ calculation tool.

The Stoney Nakoda Nation contended that the ERP is generic in nature and does not address the Eden Valley Reserve's specific public safety issues. The Stoney Nakoda Nation highlighted the poor cell phone coverage for not only the Eden Valley Reserve, but the Project area as a whole. It also noted that 61 Eden Valley Reserve residents did not have landline phone service. The Stoney Nakoda Nation questioned how Petro-Canada would contact residents should an incident occur if there was no cell or landline phone communication.

Mr. Keith Lefthand of the Stoney Nakoda Nation described numerous traditional use activities that members of the Eden Valley Reserve undertake on a routine basis in several locations and areas within the vicinity of the proposed Project. Mr. Lefthand indicated that while some members of the Eden Valley Reserve would notify grazing lease holders and landowners when their land or grazing leases were being used for traditional activities, this notification may not be followed consistently by everyone who could be out on the land. Thus, Mr. Lefthand concluded that there was the potential for the Eden Valley Reserve residents to be in the backcountry without anyone being aware that they are in the area.

The Stoney Nakoda Nation also noted that since many Eden Valley Reserve residents do not speak English, it would be extremely difficult for them to understand the ERP public information package and the appropriate safety measures to take.

The Stoney Nakoda Nation contended that the public protection measure of sheltering in place was not a viable measure for Eden Valley Reserve residents. It noted that the FNIHB-HC also shared this viewpoint. The Stoney Nakoda Nation stated that *Directive 071* referenced the Canadian Association of Petroleum Producers' sheltering-in-place guide, which is based on a dwelling built "to withstand severe winter weather." The Stoney Nakoda Nation contended that many dwellings on the Eden Valley Reserve were not able to withstand severe winter weather, and therefore were not appropriate for sheltering in place.

The Stoney Nakoda Nation expressed concern about the evacuation of Eden Valley Reserve residents. It noted that many roads within the reserve are not paved and can become impassable during extreme weather, including the only egress route out of the Eden Valley Reserve. It questioned how, with the only egress route involving the Highwood River Bridge, residents could evacuate should the bridge become impassable. It added that not all residents have a motor vehicle in which to evacuate. With one evacuation bus located on the Eden Valley Reserve, it questioned Petro-Canada's ability to ensure the complete evacuation of the reserve. The Stoney

Nakoda Nation did not accept Petro-Canada's determination that up to eight rovers are sufficient to adequately evacuate Eden Valley Reserve residents as there are currently over 100 residences on the reserve.

The Stoney Nakoda Nation argued that the Project violated ERCB setback requirements. As proposed, the trunk line would be approximately 320 m from the most westerly boundary of the Eden Valley Reserve. The Stoney Nakoda Nation argued that the Eden Valley Reserve was an urban centre for which the setback distance for a Level 3 sour gas pipeline was 1.5 km.

In its closing arguments, the Stoney Nakoda Nation submitted the *Eden Valley Sour Gas Pipeline Bylaw No. 9 of the Stoney Nakoda Nation*, which said that for health and safety reasons and due to the urban centre designation for the Eden Valley Reserve, "no Level 2 or 3 sour gas pipeline, as defined by the ERCB or the National Energy Board, shall be located within 1500 meters of the boundary of the Reserve."

7.1.2.3 The Big Loop Group

The Big Loop Group indicated that it shared many of the same concerns about Petro-Canada's ERP as other interveners. Specifically, it questioned Petro-Canada's ability to notify or locate persons in the backcountry should an incident occur.

The Big Loop Group stated that it supported the Stoney Nakoda Nation's assertion that it should be designated as an urban centre and that the 1.5 km setback applied.

7.1.2.4 The Pekisko Group

The Pekisko Group indicated that it was in support of the other interveners' position with respect to the ERP. The MD noted that the area in which the development is proposed was rough terrain subject to winter road closures. The MD also indicated that it was concerned about whether Petro-Canada could locate and evacuate people using the backcountry.

7.1.3 Findings of the Board

In *Decision 2008-029*, the Board directed Petro-Canada to amend its ERP to incorporate the revised requirements set out in the 2008 edition of *Directive 071*, including recalculating the EPZs using Version 1.18 of the ERCBH2S dispersion model and updating its public consultation to include new residents encompassed by changing EPZ sizes, and to submit any technical changes that may have resulted. The Board notes that Petro-Canada submitted an ERP to the Board in May 2008 that incorporated these requirements and that ERCB staff deemed the ERP technically complete in June 2008. *Directive 071* requirements are minimum emergency response planning requirements that must be complied with by industry.

The Board recognizes that several concerns were raised by the interveners regarding public safety and Petro-Canada's ERP. Some of the concerns expressed pertained to the accuracy of the EPZ sizes. Petro-Canada calculated the EPZs that it initially submitted to the ERCB using the nomograph EPZ calculation tool. In *Decision 2008-029*, the Board required Petro-Canada to recalculate the EPZs using the newly adopted ERCBH2S Version 1.18. Shortly following the release of Version 1.18, the ERCB made slight revisions to the model, which were included in Version 1.19 released for testing purposes some months later. Although the ERCB did not direct

Petro-Canada to use Version 1.19 or any subsequent version of ERCBH2S model, Petro-Canada presented information at the hearing that showed that both versions of the model resulted in the same EPZ size. Accordingly, the Board believes that Petro-Canada has complied with *Directive 071* requirements for EPZ calculations and that the interveners' concerns in this respect are without foundation. The Board wishes to clarify that upon resubmission of the ERP for final review and approval, Petro-Canada must use the most up-to-date version of the model.

The Board acknowledges that all the interveners supported the designation of the Eden Valley Reserve as an urban centre. Such a designation would require Level 3 developments to be a minimum of 1.5 km away from the Eden Valley Reserve.

The Board notes that the minimum setback distance is determined by the level of sour pipeline or other sour development and the land-use development (i.e., permanent dwelling, unrestricted country development, urban centre, or public facility) that exists within the proposed Project area. The density of residences affects the land-use designation, and therefore the size of the setback. For example, since the residence density of an urban centre is greater than the residence density of an unrestricted country development, evacuation of an urban centre is typically more difficult and complex than that of an unrestricted country development. Hence, the Board requires a larger setback distance in the case of an urban centre.

Setback requirements for a Level 3 pipeline as set out in *Directive 056*, Table 5.5, are as follows:

- 0.1 km to an individual permanent dwelling up to eight dwellings per quarter section
- 0.5 km to an unrestricted country development
- 1.5 km to an urban centre or public facility

The Board notes that the area of the Eden Valley Reserve nearest the trunk line has an estimated average residence density of five residences per quarter section, less than the residence density of eight residences per quarter section necessary to qualify for an urban centre designation. Accordingly, the Board finds that Eden Valley Reserve does not have a residence density corresponding to an urban centre designation and affirms the ERCB staff's March 2006 decision. The Board is satisfied that the proposed trunk line distance to the Eden Valley Reserve boundary meets the setback requirements for a Level 3 pipeline.

The Board notes that while ERCB staff determined in March 2006 that the Eden Valley Reserve does not qualify as an urban centre for setback purposes, staff indicated that for emergency response planning purposes, the ERCB may consider an urban density development designation for the Eden Valley Reserve. Such a designation could result in additional public safety features incorporated into the ERP. The Board also notes that *Directive 071*, Section 4.2, states that if an EPZ intersects an urban density development, the licensee must include the entire development within the EPZ for the purpose of conducting the public involvement program. As such, this requirement affords all the Eden Valley Reserve residents additional face-to-face consultation with Petro-Canada with respect to emergency response measures that would not be required if it were an urban centre.

The Board further notes that in its closing argument, the Stoney Nakoda Nation submitted *Eden Valley Sour Gas Pipeline Bylaw No. 9 of the Stoney Nakoda Nation*. The Board takes no position with respect to this document.

The Board finds that the ERP does include an evacuation plan for the Eden Valley Reserve residents. The Board notes that to support the plan eight rovers would be dedicated to evacuation of the reserve and that Petro-Canada has committed to use Stoney liaison personnel to address any language barriers. The Board believes that the roles and responsibilities of each emergency response team member, as well as the equipment resources and communication schemes contained throughout the ERP, are all important facets of an evacuation plan. However, the Board believes that a separate and self-contained document containing step-by-step procedures for the evacuation of the Eden Valley Reserve must be created and will condition Petro-Canada's approvals accordingly. While the Board recognizes that the majority of information that would be included in such a document is already present throughout the ERP, the Board believes that such a document would be useful to assist the residents in understanding their specific evacuation procedures. This document is to include evacuation measures, the number of persons involved in facilitating the evacuation of Eden Valley Reserve residents, any designated areas that emergency response personnel are to focus on during an incident, and the location of resources that would be called upon to assist in evacuation procedures.

The Board also agrees with Petro-Canada that the public can evacuate safely from the Eden Valley Reserve using the one egress road over the Highwood River. However, the Board expects that Petro-Canada will provide specific details in its ERP on measures employed to ensure that the road and bridge are passable at all times.

The Board notes that some interveners were concerned about locating and/or contacting transients in the backcountry and specifically identified the vastness and density of the backcountry and poor to nonexistent cell phone coverage. During its site visit of the Project area, the Board observed the sparsely populated and mountainous terrain, which is attractive to numerous recreational enthusiasts but can pose challenges for locating such transients. Therefore, further means of notification to transients in the Project area are required to be included in the ERP. The Board notes that Petro-Canada stated that placards and handouts explaining the protection measures that should be undertaken in the event H_2S odours are detected could be placed on trails and at campgrounds in the Project area. The Board agrees that such measures will increase transient awareness of potential hazards. As such, the Board will condition Petro-Canada's licences to require that its ERP include copies of the notification signs, pamphlets, or placards that Petro-Canada stated it could place along backcountry access routes, trails, and campgrounds. Further, the Board will condition the licences to address the posting of these notification signs at all recognized backcountry entry and exit routes within the Project area.

The Board is cognizant that one of the measures to be employed by Petro-Canada to detect an incident relies partly on public involvement. Petro-Canada indicated that the notification signs posted at the entrance points of the trails would include phone numbers that backcountry users could call to notify Petro-Canada of H_2S odours. The Board will condition Petro-Canada's approvals to require that every odour complaint be investigated. The Board is prepared to review this requirement after a period of implementation to assess whether or not there is a need for it.

In addition, the Board notes that Petro-Canada indicated that a cell phone tower and/or siren could be installed on the Eden Valley Reserve. Similar considerations were outlined in the agreement between Petro-Canada and the Indian Graves Campground. The Board will condition Petro-Canada's licence to require that an additional notification device be provided to the Eden

Valley Reserve and incorporated into Petro-Canada's ERP. The Board believes that such a device will assist in the notification to area residents and transients. The Board further points out that a communication device would require an education program as to procedures people should take if the device were to be activated. The Board will not prescribe the type of additional communication or notification device to be installed on the reserve and determines that such details are best left to the interested parties. Petro-Canada must complete the installation of the additional notification device prior to the commencement of operations.

The Board believes that sheltering in place is a viable public protection measure, but appreciates the Stoney Nakoda Nation's concerns that some Eden Valley Reserve residences may not be suitable for sheltering in place. The Board is satisfied with Petro-Canada's commitments to assess each residence on the reserve for its suitability to shelter in place and identify and upgrade at least one room in each residence to make it suitable for sheltering. The Board will require Petro-Canada to fulfill these commitments on a one-time basis and prior to the commencement of operations.

The Board acknowledges Petro-Canada's commitment to staff training, as well as the development and provision of H_2S information and training for local residents, ranchers, campers, and backcountry users. The Board also acknowledges Petro-Canada's commitment to hold an ERP exercise prior to start up of the central facility. Given the concerns expressed by the interveners about whether or not the ERP could be implemented, as well as the suitability of certain facets of the ERP, the Board views this ERP exercise as an opportunity for Petro-Canada to demonstrate its emergency response capabilities and to further educate the community about its emergency response measures. The Board further notes that Petro-Canada indicated that members of the Eden Valley Reserve would be welcome to participate in the exercise. Therefore, the Board will condition the approvals to require that a full-scale ERP exercise be completed prior to commencement of operations. This exercise is to include the commitments made by Petro-Canada to hold the exercise on the reserve and to include the Eden Valley Reserve residents as participants. The Board will provide the appropriate ERCB staff to monitor and evaluate the exercise. Petro-Canada is required to carry out all appropriate ERCB exercise commencement notifications and to maintain training and exercise documentation for a minimum of three years in accordance with *Directive 071*.

7.2 Hazard and Risk Assessment

7.2.1 Views of the Applicant

Petro-Canada stated that on October 14, 2008, the ERCB indicated in response to interveners' requests, that a hazard and risk assessment report was not required to be submitted in support of its applications. Instead, Petro-Canada commissioned a risk assessment report by recognized experts for the trunk line portion of the Project for its internal use only (the Risk Report). Given ongoing stakeholder concerns and questions with respect to the Risk Report, Petro-Canada stated that it decided to submit it into evidence.

Petro-Canada submitted that it used extremely conservative and protective assumptions in the development of its risk assessment, including

- assuming residences were "leaky" with a resulting 1.5 air exchanges per hour,
- assuming the release was horizontal as opposed to vertical in nature,

- assuming persons capable of sheltering in place were outside 40 per cent of the time and those persons, such as backcountry users, not capable of sheltering in place were outside 100 per cent of the time, and
- using H_2S toxicological endpoints supported by the ERCB, which are conservative.

Petro-Canada stated that if it had used realistic site-specific conditions instead of the conservative assumptions, the risk level associated with the trunk line would be lower than that shown in the Risk Report.

Petro-Canada indicated that one of the preliminary steps required for conducting a risk assessment is the identification of a hazard. It said that the primary hazard associated with a release of sour gas on the trunk line is the toxicity of H_2S contained in the gas. Petro-Canada cautioned that individuals interpreting a risk assessment report need to be cognizant of the hazard to which the assessments refer, as differing hazard identification may result in differing risk assessment findings. Petro-Canada indicated that risk assessment considers both the consequence associated with specific incidents, as well as the likelihood that an incident may impact an individual. It contended that a risk assessment is a complex and highly technical report which should be reviewed in its entirety to understand the risk associated with the Project.

Petro-Canada indicated that it did not consider the toxicity of an SO_2 plume from an ignited pipeline release to represent a public safety threat, and therefore did not address it in the report. It indicated that this was not a failure of the report because SO_2 toxicity was addressed in its Human Health Risk Assessment Report (see Section 8).

Petro-Canada agreed with Adderson that the report was based on a break at the halfway point between ESDs on segments of the trunk line and 12 per cent H_2S, instead of the applied-for 15 per cent.

Petro-Canada agreed with Adderson that if a residence was located approximately 1000 m downwind of the pipeline, indoor H_2S concentrations of 300 to 400 ppm could be detected. Petro-Canada further agreed that such concentrations were possible in a leaky residence during poor dispersion conditions. However, it contended that factors other than the risk had to be evaluated and considered. Petro-Canada noted that mitigation measures were not taken into consideration when performing such reviews. It elaborated that the frequency of an event occurring was relatively small and therefore the risk to the occupants of such residences was small.

Petro-Canada responded to questions about the locations and the validity of the meteorological data that it used. It indicated that it used the Alberta Environment (AENV) data on the frequency and strengths of winds witnessed in the area. It stated that the closest location at which the wind/stability profile was obtained was the Calgary International Airport. It also stated that its wind direction data was collected at a point 2 km east of the 10-35 well location for approximately 8 months. It further indicated that a second method to obtain site-specific meteorological frequency information was used. It used the MM5 and CALMET meteorological models to predict wind speeds and stability at several locations along the trunk line route. Petro-Canada agreed that winds out of the west to west-southwest predominate for the area.

Petro-Canada further indicated that the percentage of time spent outdoors that it applied when performing its assessment was a conservative measure and was based on information contained in a technical report submitted to the ERCB in conjunction with the Public Safety and Sour Gas review conducted by the ERCB.

Petro-Canada submitted in its closing arguments that none of the interveners presented rebuttal evidence to counter the Risk Report or present any contrary findings. Petro-Canada argued that the Stoney Nakoda Nation provided no evidence to substantiate its claims that the level of risk to the Eden Valley Reserve residents would exceed acceptable levels.

Petro-Canada indicated that the findings of its Risk Report showed that the annual individual risk was less than 10 chances in a million for permanent residents located in the Eden Valley Reserve community. Based on a comparison of these results to the Major Industrial Accidents Council of Canada (MIACC) land-use guidelines, this risk is at a level where low-density residential development could occur safely. Thus, the pipeline appears to be compatible with permanent residential development in the Eden Valley Reserve.

While Petro-Canada acknowledged that the report predicted that an incident could occur on the trunk line once in 40 years of operations, it contended that this could be mitigated given the safe operating standards that it will employ. Petro-Canada further noted that a risk can be managed by using the setback provisions established by the ERCB, which provide a separation distance between land use and sour gas systems. Petro-Canada noted that the trunk line segments close to the Eden Valley Reserve were classified as Level 3 pipelines, and that they would be in compliance with the ERCB setback requirements.

7.2.2 Views of the Interveners

7.2.2.1 The Stoney Nakoda Nation

In support of its contention that the proposed Project would have an undesirable impact to the residents of the Eden Valley Reserve, the Stoney Nakoda Nation retained an expert in public safety to review both the ERP and the Risk Report. The Stoney Nakoda Nation contended that the Petro-Canada risk findings should be of concern to both the Eden Valley Reserve and the Adderson residence.

The Stoney Nakoda Nation's expert contended that some Eden Valley Reserve residences would be exposed to a level of risk that would violate the MIACC guidelines and those of the United Kingdom and the Netherlands because in the case that assumed that sheltering in place was available, they would be in an area that was subject to a level of individual risk of greater than 10 in a 1 000 000.

The Stoney Nakoda Nation noted that Petro-Canada agreed that the risk level would not be acceptable under the MIACC if the Eden Valley Reserve had been designated as an urban centre.

It contended that Petro-Canada's risk assessment and ERP presented conflicting information. The Stoney Nakoda Nation identified portions of the Risk Report that indicated that the "toxicity of SO_2 plume(s) from a pipeline release was not considered to represent a public safety threat." It noted that the ERCBH2S model results provided by Petro-Canada indicated that within the 1.85 km downwind distance from the release location, the Alberta Ambient Air Quality Objectives

(AAAQO) for one hour SO_2 concentration on the trunk line would be exceeded. The Stoney Nakoda Nation said that the ERP and the ERCBH2S calculations for SO_2 suggested that there was a threat to human life, contrary to what the Risk Report indicated, and that for the trunk line segments in close proximity to the Eden Valley Reserve, anyone within 2 km of an ignited H_2S release would need to shelter immediately. The Stoney Nakoda Nation repeated its concern with the viability of this public protection measure.

The Stoney Nakoda Nation also questioned some of the assumptions made by Petro-Canada. It noted that Petro-Canada indicated that it assumed persons with permanent dwellings would spend 40 per cent of their time outside. Mr. Lefthand indicated that this time could be much higher considering the traditional land-use activities such as hunting and berry and medicinal plant gathering of the Eden Valley Reserve residents.

The Stoney Nakoda Nation also questioned the assumption of 1.5 air exchanges per hour and stated that there was no actual data to support this assumption.

7.2.2.2 Adderson

Adderson questioned the validity of Petro-Canada's Risk Report given that it was conducted using expected rather than applied-for H_2S concentration and operating pressures. Adderson noted that Petro-Canada used 12 per cent H_2S instead of the applied-for 15 per cent, and 6700 kPa operating pressure instead of the applied-for maximum operating pressures of 8500 kPa.

Adderson also stated that the meteorological data obtained from both the 10-25 well site location and the Calgary International Airport were not appropriate because neither location was from the Project area. It also questioned the validity of the Risk Report because the meteorological data was not used consistently throughout the report. It noted that the 10-25 monitoring station was in place for only eight months and was no longer there.

It also stated that the report was flawed because Petro-Canada modeled a pipeline release occurring in the middle of the trunk line segments between the ESD valves. It contended that ruptures along pipelines do not always occur mid-way between ESD valves. It questioned whether the risk level would be different if the release occurred at points other than half way between the ESD valves.

Adderson concluded that Petro-Canada did not take the assessment process seriously because if it had, it would have used more accurate data and methodology.

Adderson isolated key findings in the risk assessment (particularly the 5 per cent area rupture scenario) as an indication that the Project presented unacceptable risks. It stated that even Petro-Canada's expert acknowledged that a 5 per cent pipeline rupture could take 30 minutes to detect and isolate, at which time the sour gas plume may have travelled 8 km downwind of the rupture point. Adderson indicated that its residence and property were substantially closer to some segments of the trunk line than 8 km. Adderson further indicated that the findings as contained in the Risk Report did not provide it with any sense of comfort.

7.2.3 Findings of the Board

The Board does not require that risk assessment reports to be submitted routinely in order to determine the level of risk a proposed sour gas development may represent. This does not detract from the Board's interest in public safety or risk-related issues. The Board's number one priority is public safety. It has in place a number of regulatory requirements such as setback distances, ERPs, and sour pipeline design criteria as means to manage the risk of sour developments. Such significant risk control requirements reduce the frequency of an incident occurring, thus resulting in a potential H_2S release being extremely unlikely. Notwithstanding the low probability of a sour gas release, the Board requires ERPs to be developed and in place to protect the public.

Since Petro-Canada submitted a risk assessment, the Board has taken it into consideration in its deliberations for the proposed Project. In its deliberations, the Board considered whether the findings in Petro-Canada's risk assessment present an acceptable risk to the public.

The terms "hazard" and "risk" are two different concepts, but are frequently used interchangeably in today's society. This incorrect use and understanding of the concepts, combined with the highly technical and complex nature of analytical hazard and risk assessment procedures and reports, has the potential to mislead parties about the risks associated with a particular development. Assessments that do not incorporate all the mitigation measures that a company may apply do not accurately reflect the public's level of risk; therefore, the public may be left with an unrealistic and inflated view of the risk level. The Board recognizes that hazard and risk assessments are difficult concepts, especially considering the different perspectives the public may have on risk acceptability.

A hazard and risk assessment report consists of three components: a hazard analysis, a risk analysis, and a risk assessment. The main hazard associated with developments such as Petro-Canada's proposed Project is the toxicity of H_2S contained in the released gas. Once the hazard has been determined, the risk analysis is undertaken, which considers the likelihood of the hazard occurring and its magnitude. The risk assessment determines the acceptability of the calculated risk by comparing it against the MIACC or other guidelines.

The Board notes the contention of the Stoney Nakoda Nation's expert that some Eden Valley Reserve residents would be exposed to a level of risk that would violate the MIACC guidelines because in the case that assumed that sheltering in place was available, they would be in an area that was subject to a level of individual risk greater than 10 in a 1 000 000. The Board finds that the expert was incorrect. The Board notes that in the case that assumed sheltering was available, there were no residents in the area that would be subject to a level of individual risk greater than 10 in a 1 000 000. This meets the MIACC guidelines risk acceptability criteria for low-density residential development of less than 10 in a 1 000 000.

The Board recognizes that some interveners questioned the validity of the Risk Report's findings for a number of reasons. One concern highlighted by interveners was that Petro-Canada used expected values of H_2S concentration and operating pressures rather than the applied-for values. The Board finds no fault with this methodology. This is similar to the methodology applicants can use with the ERCBH2S model in conjunction with ERP development. In ERCBH2S, the Board allows applicants to calculate the EPZ based on the maximum expected operating pressure and H_2S concentration, rather than the maximum applied-for values. Additionally, the Board notes that Petro-Canada carried out both the risk assessment and the EPZ calculations using the

same H_2S concentration of 12 per cent. The Board believes that more realistic risks can be estimated by using the expected operation conditions. These expected operating conditions must not be exceeded in actual operations without first recalculating the EPZs and receiving prior ERCB approval of an ERP amendment, in accordance with *Directive 071* requirements.

The interveners raised similar concerns about the locations from which Petro-Canada obtained meteorological data. The Board agrees that the meteorological data used in the Risk Report were from locations outside of the trunk line area. However, the Board notes that Petro-Canada used data from two approaches: the wind direction profile obtained at the 10-25 well site combined with the wind/stability profile from the Calgary International Airport, and the wind direction and wind/stability profiles for each pipeline location based on the MM5 and CALMET meteorological modelling output.

The 10-25 well site, located approximately 5 km to the northwest of the proposed central facility location, was operational for eight months. The monitoring station at the Calgary International Airport is one of six stations in the province operated by AENV. The Board appreciates that the Calgary International Airport monitoring station is located over 100 km away from the Project area. However, this distance does not indicate that the monitoring station's meteorological information is not valid or pertinent.

The use of the first approach has the advantage of being based on actual field measurements, while having the disadvantage of representing a singular location that is different from the Project area. The use of the second approach (i.e., MM5 and CALMET) has the advantage of allowing meteorological conditions to vary according to location due to terrain influences, but an associated disadvantage of having to rely on theoretical output in lieu of actual measurements. However, the Board believes that Petro-Canada used a reasonable representation of meteorological conditions, as the uncertainty in the meteorological data was minimized by adopting both the modelled site-specific data and the actual measured data for the risk assessment.

The Board notes that some interveners were concerned that the risk assessment was based on a full guillotine rupture at the midpoint of segments. The Board is of the view that this is an acceptable approach because the total mass released is independent of the rupture location for a guillotine rupture.

The Board believes that Petro-Canada's assumption that transients would be outdoors 100 per cent of the time is the only reasonable assumption that can be made. The Board believes that Petro-Canada's assumption that residents in the area would be outdoors 40 per cent of the time is also a reasonable assumption since that represents more than 9.5 hours out of the day.

The air exchange rate for a residence is a measure of how leaky a home is and is used to estimate indoor H_2S concentrations for sheltering. The Board believes that Petro-Canada's use of 1.5 air exchanges per hour is appropriate and conservative because the median home in Alberta has about 0.5 air exchanges per hour and a leaky home has 1.0 air exchanges per hour.

With respect to Petro-Canada's assumption that the release would be horizontal instead of vertical, the Board believes that this too is a conservative assumption. The Board is aware that because a horizontal release does not rise as much as a vertical release, a horizontal release may

result in a larger hazard area under some conditions, and consequently, the dispersion may not be as great as that for a vertical release.

Given the reasons above, the Board finds the methodology and assumptions used in the preparation of the Risk Report to be reasonable. In addition, the Board finds the estimated risk for the residents in the Eden Valley Reserve is acceptable and meets the MIACC's risk acceptability criteria for low-density residential development.

8 ENVIRONMENTAL EFFECTS

While Petro-Canada evaluated a number of factors in its EA, the interveners chose to focus their submissions on their key issues and areas of concern, namely, the effects of direct ground disturbance, access management, noise, and air emissions in the area. They argued that the Project could potentially affect watershed management, endangered fish species (primarily westslope cutthroat trout), grizzly bears, wolves, fescue grassland reclamation, weed introductions, and rare plant species.

During the hearing, several of the expert witnesses made reference to the Southern Foothills Study (SFS) (see Figure 3).This was particularly central to discussions regarding cumulative or regional effects of all land uses. The SFS was a process to evaluate cumulative land-use trends and the implications of various management options in a broad region of south west Alberta that includes the Project area. Although the initiative was driven primarily by landowners and the ranching industry, the study also included the petroleum industry (including Petro-Canada), environmental organizations, and the Alberta government. Dr. Brad Stelfox conducted the modelling for the study and also appeared as an expert witness for Adderson.

8.1 Environmental Assessment

8.1.1 Views of the Applicant

Petro-Canada submitted that it completed its EA, which it filed along with its application materials for the Project, to meet the intent of *IL 93-09* and *Bulletin 2007-35: Clarification of Informational Letter (IL) 93-09: Oil and Gas Development Eastern Slopes (Southern Portion)* by filing an integrated application for the approval of its Project. It submitted that *IL 93-09* and *Bulletin 2007-35* do not provide a terms of reference to guide the environmental information and assessment filing requirements for Eastern Slopes projects, but that its applications had met the spirit of the documents.

Petro-Canada stated that the Project area was important relative to watershed values, native grasslands, grazing resources, wildlife, biodiversity, scenic quality, traditional land use, forest and energy resources, recreational use, and other activities. It submitted that when determining how its project should be implemented, it factored in an understanding of the natural and historical context, and a full range of values of the area.

Petro-Canada explained that it undertook its EA once it had developed a final preferred project layout and Project Development Area (PDA), which it defined as including areas that will be disturbed by well and facility pads, pipeline and road ROWs, and temporary work spaces. Petro-Canada argued that the PDA for the entire Project would be less than 150 hectares, that it

submitted one of the most comprehensive EAs ever filed for an Eastern Slopes project of this nature, and that it recognized the importance of the area to many stakeholders. It stated that the EA identified potential interactions between the Project and key environmental resources in the area, and that when Project effects were considered to potentially contribute to broader regional issues or cumulative effects, it evaluated the Project's contributions in the context of future land-use scenarios.

Petro-Canada stated that the Project could proceed in an environmentally responsible fashion, taking into account current and anticipated land uses in the region. Petro-Canada stated it developed mitigation strategies for key issues relating to wildlife and wildlife habitat, impacts to native fescue grassland ecosystems, watershed protection, protection of fisheries resources, access management, protection of grizzly bears, reclamation planning, and cattle management. It submitted that its development of appropriate mitigation strategies was thorough, and that these had been developed in consultation with area stakeholders including residents, ranchers, First Nations, and government agencies. Petro-Canada submitted an Environmental Protection Plan (EPP), which addressed regulatory compliance, and provided protection measures for all Project components through the construction, drilling and completions, operations, and reclamation phases of the Project. The EPP contained a Spill Contingency Plan, Directional Drill Fluid Release Contingency Plan, Wildfire Control Plan, General Monitoring Plan, Palaeontological Monitoring Plan, Reclamation Plan, Cattle Management Plan, Access Management Plan, and Timber Salvage Plan, as well as Construction Typicals, Construction Alignment Sheets, Reclamation Alignment Sheets, and Watercourse Crossing Site Plans. Petro-Canada concluded that no unacceptable effects on the biophysical environment would occur as a result of this Project due to the implementation of its proposed mitigation measures.

Petro-Canada argued that the size of its EA's Local Study Area (LSA) of 468 square kilometres (km^2) was justified, as the unit comprising the LSA represents an ecological unit of some consistency. As the LSA is bounded on the east by the foothills natural region and on the west by the first height of land, Petro-Canada maintained that it was a reasonable ecological unit from which to assess Project effects on wide-ranging species such as grizzly bear.

Petro-Canada argued that monitoring would be the key to understanding the effectiveness of its environmental protection measures and modifying them as needed. Petro-Canada designed its monitoring program to be conducted during construction, drilling, cleanup, operation, abandonment, and reclamation, and noted that it would carry out its monitoring with visits to all road and pad locations, the central facility, all watercourse crossings, and the pipeline ROW.

Petro-Canada advised the interveners of changes to its monitoring program at the opening of the hearing. It committed to continuous monitoring of all Project components, including watercourses, reclamation, erosion control, and access control procedures during the construction stage.

With regard to the gathering system, Petro-Canada submitted that (after construction was complete) it would monitor ROWs and water crossing locations on a monthly basis for the first year. With regard to the trunk line, it would monitor the line monthly or at a frequency that it deemed appropriate based on the results of its inspections.

Petro-Canada stated that it would conduct monitoring of the gathering system and trunk line four times per year in years two to five, or more frequently, weather permitting. After five years, it planned to reduce its monitoring to a minimum of once a year or more frequently as required.

8.1.2 Views of the Interveners

At the hearing, Petro-Canada questioned the expert witnesses of the interveners on the topics of watershed management, fish, rare plants, weeds, reclamation, grizzly bears, and cumulative effects. Under cross examination by Petro-Canada, however, it was revealed that the interveners' experts had not reviewed the EPP prepared for and filed by Petro-Canada in preparation for the hearing.

8.1.2.1 The Big Loop Group

The Big Loop Group expressed the opinion that Petro-Canada's evaluation of the significance of the Project's environmental effects was subjective. It was of the view that people who were involved in the Project's design could not have been objective in carrying out the subsequent EA.

The Big Loop Group argued that if Petro-Canada intended to minimize the effects of the Project on the environment using a variety of mitigation strategies, it should have supplied evidence in its EA that was representative of similar situations, similar topography, and involving similar species in order to demonstrate the effectiveness of these strategies. It also argued that Petro-Canada's predictions of mitigation efficiency were continually used with little or no supporting data and that there was no empirical data provided upon which the Board could evaluate Petro-Canada's proposed mitigation strategies.

The Big Loop Group argued that the monitoring section of Petro-Canada's EA was the least detailed section, and that Petro-Canada failed in that section to distinguish between monitoring to determine if mitigations have been implemented and monitoring to determine the effectiveness of those mitigations. It also argued that Petro-Canada lacked clear statements of goals and in its monitoring plans had made no attempt to prioritize monitoring. Further, the Big Loop Group argued that Petro-Canada provided no indication that monitoring would continue until it was evident that problems had been rectified or that the natural range of variation had been captured to understand whether or not its mitigation measures were effective.

8.1.2.2 Adderson

Adderson argued that the Project would have too high of an environmental cost, and therefore its approval could not be justified. It did not agree with Petro-Canada's position that the Project could be carried out without unacceptable environmental effects. Adderson argued that until such time that the gas could be extracted at a lower environmental cost, the targeted gas reserves would remain intact. Therefore gas reserves in this area should not be developed at this time.

Adderson expressed concern that the boundary of the LSA was 5 to 7 km away from the Project footprint in some areas. It maintained that this could artificially dilute the magnitude of Project effects in the EA by creating a large study area relative to the Project footprint so that the Project's effects would appear small in proportion. Adderson argued that the boundary of the LSA should have been 1 km from Project disturbances because most Project effects would occur within a zone of influence that likely would not exceed this distance.

8.1.2.3 The Pekisko Group

The Pekisko Group argued that crossing the headwaters region with the proposed trunk line would effectively create a linear disturbance that would divide the landscape in half, creating both unacceptable negative impacts as a result of fragmentation and the potential for increased access. It argued that the Project would create a larger industrial footprint in the upper Pekisko area (see Figure 5 for location of Pekisko Range Grazing Allotments) than all the manmade trails of the last 120 years combined. The Pekisko Group was of the view that Petro-Canada's proposed development would not be compatible with the environment, watershed, or people of the area. The Pekisko Group submitted that a linear disturbance such as a pipeline would change the perspective that people have toward the Eastern Slopes. It argued that, should the Project be approved, people might be less inclined to preserve the landscape and ecological values of the Eastern Slopes and be more inclined to allow disturbances in the area. The Pekisko Group argued that the area in question is a place where virtually no disturbances exist and that it needs to be preserved as such for future generations. It was adamant that this should be an are of last resort for oil and gas development in the province.

8.1.3 Findings of the Board

IL 93-09 and *Bulletin 2007-35* outline no specific terms of reference, but provide latitude for applicants to determine and address the environmental sensitivities identified through planning and consultation. The Board is of the view that Petro-Canada has conducted an extensive EA that addresses a broad range of concerns.

In addition to identifying Project environmental effects, the EA provides an analysis of their significance, focusing on magnitude, extent, duration, reversibility, and likelihood of occurring. This is an unusually large amount of information and analysis for an *IL 93-09* EA. The Board is pleased with Petro-Canada's efforts in conducting such an extensive EA and encourages the use of such evidence by proponents. Having said that, the Board considered whether the EA has led to valid conclusions regarding the risks or likely effects of the Project and whether appropriate mitigation measures and how they will be implemented have been considered.

The Board notes the interveners' arguments regarding the size of the study areas used in the EA in relation to Project effects. Regardless of what study area is used to evaluate Project effects, the Board notes that Petro-Canada has provided the actual PDA in its EA. This allows the Board or any other party the opportunity to evaluate Project effects at any scale and using any study area that it believes is appropriate. Petro-Canada chose to evaluate its Project at a large regional scale and at a smaller watershed scale. The Board is of the view that these scales are appropriate for evaluating effects on the resources of concern in that many of the interveners' concerns centered on watershed and wildlife values.

The Board is very concerned that the interveners' experts retained to provide opinions about watershed values, fisheries, soils, rare plants, grizzly bears or cumulative effects indicated that they had not undertaken a review of Petro-Canada's EPP. These experts specifically indicated that they had not reviewed the EPP. The Board is of the view that the lack of such a review and analysis by the interveners' experts prevents it from being able to fully understand the interveners' views on the mitigation measures proposed in the plan by Petro-Canada, and therefore to take their views regarding the mitigation measures into account.

Having considered all of the evidence, the Board finds that Petro-Canada has incorporated appropriate mitigation measures into its EPP. The Board agrees with Petro-Canada that monitoring is key to evaluating mitigation measures applied to the Project in order to minimize environmental effects and continuously improve environmental management. The Board believes that in order for monitoring to be meaningful in terms of evaluating Project effects, it is important that monitoring plans include a clear statement of desired outcomes and measures of success. The Board expects Petro-Canada to work with SRD and AENV to develop appropriate monitoring plans prior to the commencement of construction. In addition to the monitoring planned by Petro-Canada, the Board expects that the need for monitoring effects on aquatic ecosystems, grizzly bears, and wolves will be discussed by Petro-Canada with SRD and AENV.

8.2 Surface Water Quality and Fisheries

8.2.1 Views of the Applicant

Petro-Canada acknowledged and agreed with the interveners that the Project would be located within several watersheds of high conservation value (see Figure 4). It submitted that it was committed to extracting and producing the resource in a respectful and environmentally responsible manner, and it claimed that it understood that impacts to these watersheds may occur beyond proposed watercourse crossing locations. However, as a result of the work undertaken in support of its EA, Petro-Canada concluded that there were limited pathways by which the Project could affect surface water quality or quantity. With this in mind, Petro-Canada stated that it developed mitigation measures appropriate for protection of the watersheds and contended that its Project would avoid many potential effects on surface water resources through appropriate siting, routing, and timing. Specifically, it designed detailed erosion control and mitigation strategies for its proposed roads, pipelines, and well pads to prevent the degradation of water quality through erosion, sedimentation, and potential releases of contaminants.

Petro-Canada submitted that the Project would involve 40 watercourse crossings as defined by AENV's *Code of Practice for Pipeline and Telecommunication Lines Crossing a Water Body* (the Code). Petro-Canada clarified that although it initially identified 72 potential watercourse crossings in an earlier, longer version of its proposed Eden Valley trunk line route, ground-truthing and modifications in route alignment resulted in the number of watercourse crossings for the Project being reduced to 40. Petro-Canada submitted there is nothing unique about these watershed areas from a watercourse crossing, pipeline, or environmental protection perspective.

According to Petro-Canada, field studies allowed it to modify the Project to reduce disturbances in areas of soil instability, as well as establish the PDA on terrain that it considered very acceptable for development. According to its EA, 43 per cent of the PDA would be at high to very high risk of soil erosion by water, while 57 per cent would be considered at low to moderate risk.

Petro-Canada explained that environmental, construction, hydrological, and geotechnical specialists worked together on the design of each watercourse crossing to ensure that short and long term risks to the flow and water quality of the watercourse would be minimized. Petro-Canada submitted it designed all of its watercourse crossings to be able to withstand a 100-year flood event.

Petro-Canada stated that it worked to reduce the pipeline ROW width at watercourse crossings to the extent possible for open cut and isolation crossings, and that it intended to leave riparian areas intact by drilling under stream beds. It developed design specifications for its watercourse crossings based on channel and approach slope characteristics, flow rates, scour potential, and instream timing restrictions. It based watercourse crossing locations and mitigation measures on fish presence, habitat sensitivity ranking, water flow, construction schedule, federal and provincial statutes, regulations, codes of practice and operational statements, and construction constraints. Petro-Canada submitted it developed detailed design reports for each crossing, and that it designed its watercourse crossing mitigation measures based on accepted industry best practices, including the *Pipeline Associated Watercourse Crossings* manual prepared by the Canadian Association of Petroleum Producers, the Canadian Energy Pipeline Association, and the Canadian Gas Association, and endorsed by Fisheries and Oceans Canada (DFO). It explained that operating statements from DFO and provincial codes of practice now provide clear guidelines on appropriate crossing methods and construction timing. Petro-Canada submitted that it incorporated ongoing input regarding crossing sensitivity, timing, and construction methods provided by DFO and SRD.

Petro-Canada submitted that all of its watercourse crossings would have gradual grades and would be located along straight stretches of the watercourses in question. This would limit the potential for scour on a side bend or on a bend, which is typically where most of the erosion would take place. Once the pipe was installed, watercourse crossing and approach slopes would be stabilized and reclaimed to prevent subsequent channel migration or sedimentation. Petro-Canada argued the Project would not contribute to erosion and flooding risks, nor be affected by such events. It stated that it expected effects upon the environment in the region to be short term and highly localized.

Petro-Canada stated that its watercourse crossings would meet or exceed the standards outlined in the Code. In response to the assertion of Mr. Fitch, an expert witness for Adderson, that AENV's Code represents minimum standards, Petro-Canada stated that the Code is the provincial regulatory standard for pipeline water body crossings, that the Code did not explicitly require watershed level assessments for pipeline crossings, and that its assessments were done to meet provincial standards.

With respect to concerns regarding significant erosion at crossing locations during spring flood events, Petro-Canada responded that much of the Project area is mature conifer forest with very little overland flow, the headwaters region acts as a hydrological sponge for the area, and this area does not flood in spring on a regular basis. Therefore, Petro-Canada submitted the actual scour potential of many of the feeder creeks and tributaries would be considerably less than the main stems.

Although Petro-Canada testified that it designed its erosion protection control measures to withstand extreme events, it admitted that such measures could be overwhelmed at times. It stated that if such an extreme event occurred, protective measures would be put back in place or repaired. Petro-Canada also stated that it proposed increasing the rigor of its monitoring program beyond that specified in the EPP as it relates to watercourses, erosion control, and reclamation by tracking the success of its control procedures.

Petro-Canada submitted that natural flooding in this region already carries high sediment loads. To avoid contributing to them, it committed to shutting down operations should it encounter situations of high water flows in the area during construction. Petro-Canada committed to not just reclaiming its own creek crossings, but also to restoring additional creek crossings should there be downstream crossings within the region that are found to be in poor condition.

Petro-Canada proposed horizontal directional drilling (HDD) for eight crossings: two on the gathering system and six on the trunk line. It selected HDD to avoid instream activities in watercourses that it deemed to have high sensitivities and fisheries values based on known sportfish presence, habitat sensitivity ranking, water flow status (width, depth, expected flow), Project construction schedule, restricted activity periods for instream work, and construction constraints identified during field scouting. It defined HDD as a method of crossing a stream or any other obstruction by drilling underneath that body to create a hole large enough to pull a pipeline through. At each of the HDD crossings, it conducted a geotechnical analysis to determine if the drill would be technically feasible.

Petro-Canada submitted that it did nine evaluations in the headwaters region to determine the feasibility of HDD. It found seven to be feasible along the trunk line route; the exceptions were Johnson and Bear Creeks, both of which contain genetically pure westslope cutthroat trout. It planned eight directional drills for creek crossings in the overall Project area, even though all but two of those crossings, the Highwood River and Flat Creek, could be crossed with much less-expensive isolation techniques. Additionally, Petro-Canada proposed crossing eleven permanent water courses using isolation or open cut methods.

Petro-Canada stated that the potential for a frac-out (or release of drilling fluid to surface) during HDD is one of the major reasons that a geotechnical analysis is conducted. Petro-Canada retained a company to conduct its directional drills that had been doing so since 1997 and that had completed 456 HDDs (three of which resulted in frac-outs that released fluids into a water body). As a precautionary measure, Petro-Canada developed a directional drill fluid release contingency plan to address the unlikely event of a release.

Regarding the release of horizontal drilling fluid into a watercourse, Petro-Canada testified that the mud constituents that would be used would be benign and not of a toxic nature. Consequently, it argued that a release of HDD fluids into a watercourse would be comparable to a sedimentation event. Petro-Canada further submitted that locating its watercourse crossings to ensure they would not be at spawning locations would also reduce the risk to fisheries from frac-out.

With respect to pipeline leaks during operations, Petro-Canada stated a leak could be difficult to detect but would be very unlikely to occur due to its corrosion mitigation and inspection programs. In order for its Project to have an impact on a water course, a leak would have to occur within the vicinity of the water course and would have to migrate into the water and not into the surrounding area. Petro-Canada argued that this, coupled with the amount of pipeline actually crossing water courses, would result in a low likelihood of an occurrence.

Petro-Canada stated that it included toxic events, such as spills of diesel fuel or antifreeze from machinery around watercourses in its development of appropriate mitigation measures. It indicated that, should a leak occur and H_2S be released into the water (bearing in mind that in many of the watercourses in question, the waters are moving and in some cases turbulent), the

H_2S would likely volatilize quite rapidly with very little of it actually becoming entrained in the water column.

In addition to flowing watercourses, Petro-Canada's Project would cross low-lying seasonally wet areas, including ephemeral draws, swales, and seeps that Petro-Canada testified it did not expect to be excessively wet during the scheduled construction period. According to Petro-Canada, there would be three wetland areas located within the project footprint, none of which are permanent or semi-permanent wetlands. Petro-Canada stated it would cross wetlands with equipment and vehicles by using swamp matting or corduroy, with construction occurring in winter. It argued that by using swamp matting and effective cleanup measures, the Project would not affect the ecological function of wetland areas. Petro-Canada argued that no interveners challenged its efforts to avoid wetlands or the adequacy of its wetland protection measures.

In response to criticisms by BLG that its existing fuel gas pipeline had washed out in June 2008 and was a source of sedimentation to Johnson Creek, Petro-Canada explained that the pipeline was built by a previous owner over 40 years ago. Petro-Canada stated that as part of this Project, the existing fuel line is to be replaced with a new pipeline that would be separated from Johnson Creek by Highway 532 and a patch of deciduous and coniferous forest along the highway. It further stated that as part of the replacement, it would reclaim the existing fuel gas pipeline ROW on the slope adjacent to and above Johnson Creek.

Petro-Canada indicated that it recognized the fisheries value of the region, and was aware of the difficulties associated with a species of fish in the area known as genetically pure strain westslope cutthroat trout, which are known to occur in the Project area. Westslope cutthroat trout is considered a threatened species by the federal Committee on the Status of Endangered Wildlife in Canada and is also currently under review for listing under the federal *Species at Risk Act*. Although recovery planning under that act for westslope cutthroat trout has not been initiated and critical habitat has not been identified, the species is considered as "May Be At Risk" in Alberta. With further regard to recovery planning, Petro-Canada stated that it is a participant on a provincial recovery planning team that has been formed to develop a recovery plan for the westslope cutthroat trout.

Petro-Canada generally described the presence of cutthroat trout in its 2007 EA. At that time the presence of the genetically pure strain was confirmed only in Cutthroat and North Twin Creeks, however no additional genetic testing had been done. Since the original submission, Petro-Canada provided a Fisheries Update to Interested Parties in November 2008. The update confirmed the existence of the genetically pure strain in Jonson and Flat Creeks, and in Pekisko Creek above McConnel Falls. Based on genetic testing by SRD conducted on additional samples collected by Petro-Canada, the presence of genetically pure westslope cutthroat trout was confirmed in Iron and Coral Creeks as well. Petro-Canada was made aware of these results in October 2008. It used these results to modify its prescribed watercourse crossing methods.

Regarding population declines of westslope cutthroat trout in the Project area, Petro-Canada stated that the historical reasons for such population declines include overharvesting and introductions of nonnative rainbow and brook trout that hybridize with it. Petro-Canada also explained that populations of westslope cutthroat trout upstream of natural barriers such as McConnel Falls (NW14-16-4W5) are likely native, while populations downstream of those

barriers are likely hybridized. Therefore, there is a high likelihood that pure strain trout could be found in stream reaches near many of the watercourse crossings.

Petro-Canada stated that it conducted detailed fisheries assessments on the 24 watercourses with a defined bed and bank as directed by the Code, as well as a considerable amount of field work to determine where fisheries were present. It stated it looked for potential spawning and overwintering locations, and avoided these as potential watercourse crossing sites. It considered protection of westslope cutthroat trout in conjunction with measures to maintain the productive capacity of aquatic habitats. Petro-Canada stated that its EA evaluated potential effects of the Project on all fish species and fish habitat, rather than focusing on any one particular species. It further stated that it designed the pipeline watercourse crossings with a view to protecting all fish habitat in the headwaters region, rather than specifically targeting westslope cutthroat trout and its habitat.

Petro-Canada stated that hybridization between westslope cutthroat trout and nonnative introduced species is currently one of the native trout's greatest threats in this region. Petro-Canada also stated that because genetic testing to determine the presence of pure strain westslope cutthroat trout in all watercourse crossings had not been conducted at the time of route planning, the trunk line route was based upon the habitat sensitivity of the watercourses that were known to support fish or that could potentially support fish, not necessarily upon the presence of westslope cutthroat trout in specific watercourses to be crossed by the trunk line.

Petro-Canada also stated that another threat to westslope cutthroat trout in the region is the loss of habitat productivity because of sedimentation. It indicated that it had designed every watercourse crossing for the width of the active channel rather than for the width of the flowing channel that would be present at the time of construction. It indicated it collected detailed geotechnical information on each watercourse crossing location to evaluate the scour potential of the watercourse and the potential for any kind of channel migration. It submitted that pipelines would be placed well below the scour potential of each watercourse crossing site.

Petro-Canada stated that in the event of an emergency situation during operations, activities within the Restricted Activity Period for in stream activity would be accommodated by SRD. In such a situation, Petro-Canada stated it would contact SRD to identify an appropriate construction technique to maintain the downstream water quality and reduce sediment loads to the best possible degree. If Petro-Canada had to access the trunk line for repairs within the Restricted Activity Period, it stated it would work with local authorities, SRD, and DFO to establish a plan that would ensure the protection of the fisheries and water resources in the area.

Petro-Canada submitted that its proposed crossings either met applicable DFO operational statements or have been reviewed by DFO under the terms of the Project's final draft letter of advice it issued to Petro-Canada on November 3, 2008. Petro-Canada stated this was a final draft letter of advice that DFO will finalize and provide to it upon completion of the hearing. Petro-Canada also stated that DFO is in agreement with its proposed watercourse crossing methods and that it would not receive approvals if DFO thought sedimentation was going to be affecting the productive capacity of streams. Petro-Canada argued that DFO has clear authorization procedures, and where it believes that there is no harmful alteration, disruption, or destruction of habitat involved, it provides a letter of advice or a letter of direction to applicants.

8.2.2 Views of the Interveners

8.2.2.1 The Big Loop Group

The Big Loop Group submitted that watersheds are a gathering system for water and energy and that much of the water available in a watershed is captured and stored, at least temporarily, in headwater areas. It argued that Petro-Canada had chosen to place its development as high up in the headwaters area of the Eastern Slopes region as possible, which would inevitably result in siltation and other negative impacts on the watershed in this region.

From a watershed perspective, the Big Loop Group argued that Petro-Canada essentially limited its EA to assessing the Project's potential impacts on fisheries at watercourse crossing sites. The Big Loop Group also argued that Petro-Canada demonstrated an inability to understand the importance of small streams, intermittent streams, and drainages in selecting its crossing methods. It submitted these are all part of the watershed and that their value should not be understated. In particular, it argued that the EA did not analyze impacts on riparian areas, riparian area health, and functioning of adjoining streams. The Big Loop Group argued that these analyses would have provided insight into stream bank stability, channel meander rates, fish habitat, and sediment and erosion issues, and would have enabled Petro-Canada to provide a better assessment of Project effects. The Big Loop Group also argued that Petro-Canada should have evaluated shallow groundwater flow and not just surface water flow in its EA.

The Big Loop Group maintained that the Project would include 72 watercourse crossings, all of which transport water through small tributaries into larger watercourses and ultimately into Pekisko and Willow Creeks. It argued that all 72 watercourse crossings, including ones that may have been dry during the months observed by Petro-Canada in August and September, could contain water in wetter times of the year.

The Big Loop Group submitted that Petro-Canada's EA did not include hydrological information to determine stream flows for individual streams, and that, at best, Petro-Canada extrapolated flow from distant gauging stations. It argued that Petro-Canada's EA did not include any analysis to predict the effects of climate change on stream flows, nor did it suggest any modifications to the design criteria for pipeline construction or reclamation. The Big Loop Group submitted that this information may be crucial from a design perspective in order to enable one to understand whether or not things like bridge crossings, scour depths for pipelines, and the utility of bank stabilization or bank mitigation devices will be successful. It pointed out that Petro-Canada's existing sweet gas pipeline along Highway 532 had previously been washed out on several occasions of high water flow.

The Big Loop Group agreed with Petro-Canada that HDD can work well for watercourse crossings. However, it argued that when HDD fails, it fails in a spectacular way and that it is not without its own environmental impacts. It argued that HDD would require heavy equipment to be transported to sites, and that bell holes would have to be constructed for the entry and exit of the pipe from the borehole.

The Big Loop Group submitted that sediment in water might be considered natural in small amounts or at low levels, but that higher levels result in negative impacts on fish and other aquatic species. Its witnesses submitted that the effects of sediment were constantly understated in Petro-Canada's EA. In their view, the EA did not assess the full cumulative effects of

sedimentation in watercourses. According to the Big Loop Group, sediment accumulates and persists in streams, particularly in smaller ones, due to the lack of flows sufficient to flush the sediment downstream. Sediment accumulation can potentially reduce the depth and volume of over-wintering pools used by fish and creates embedded substrates, which are resistant to flushing flows.

The Big Loop Group argued that Petro-Canada did not correctly address the temporal aspects of sedimentation in its EA. It submitted that soil erosion occurs not just during and immediately following construction, nor is it just a phenomenon of the spring season. It argued that erosion and accompanying sediment transport can occur over and beyond the lifespan of the Project. The Big Loop Group argued that this can happen at any time of year and, in this area, it can happen during chinooks, heavy rainfall, and high spring flow.

The Big Loop Group witnesses further argued that sediment load is the sum total of all the anthropogenic sources of sediment plus the natural background levels of sediment that occur in the system. Without competent cumulative effects analysis aided by a comprehensive water quality benchmark that has taken place through rigorous monitoring over a sufficient geographic area and time span, it testified that there was no way that Petro-Canada's EA could determine current sediment loads and the effects of increased sedimentation from the Project.

The Big Loop Group further argued that Petro-Canada's EA understated sedimentation caused by human activity. It maintained that linear disturbances (such as pipelines and roads) intercept runoff and accumulate sediment, thereby shortening the distance from the source of runoff to the stream, which in turn increases the speed of water delivery and the potential for erosion. The Big Loop Group argued that doubling the speed at which water moves increases its ability to erode by four times, enabling that volume of water to carry 64 times more sediment.

The Big Loop Group submitted that linear disturbances short circuit water flows and prevent sediment-rich water from being filtered through terrestrial vegetation, which can often overwhelm the filtering and buffering capacities of riparian areas. Its witnesses stated that linear disturbances that occupy as little as one to ten per cent of the watershed can contribute up to 85 per cent of the sediment found in that system. It argued that although Petro-Canada attempted to leave a small footprint, Project disturbances would have a disproportionate effect in terms of sediment transport.

The Big Loop Group also submitted that this effect would be exacerbated by the fact that Petro-Canada proposed its trunk line route to go through very erosion-prone soils and highly variable topography. It maintained that the steep slopes and sensitive soils receive a fair bit of moisture and are subject to chinooks in winter, creating a high risk of soil erosion. In addition, it stressed that due to unpredictable chinooks, soils in the area are not always frozen throughout the winter period. Further, it argued that erosion and sedimentation mitigation measures are generally ineffective both in the short and long term.

The Big Loop Group argued that any development in sensitive areas such as this would require strong enforcement of shutdown criteria to ensure that construction or operations would not occur in conditions of unfrozen soil, active runoff, snow melt, or active seepage. It argued there would be a need to have personnel on site with the authority to shut down a project if unsuitable conditions developed. In its view, effective implementation of any shutdown protocol would require strict, well-defined shutdown criteria.

The Big Loop Group's expert, Mr. Fitch, described a multiyear study that he coauthored.[2] The study evaluated the effectiveness of a variety of instream and bank erosion control structures. A total of 500 sites were studied on 25 streams, ranging from streams as small as some that would be encountered on Petro-Canada's proposed trunk line, to watercourses as large as the Oldman, Crowsnest, and Castle Rivers. After a 1-in-3-year flood, 37 per cent of the structures failed. After a 100-year flood, 81 per cent failed. The study also examined whether structures were effective in replacing or mitigating fish habitat and in many cases the failure rates were greater than those above.

With regard to fisheries, the Big Loop Group submitted that there are two fish species of concern that use waters in the Project area, namely, westslope cutthroat trout and bull trout. It expressed concern that crossing numerous watercourses during construction and ongoing maintenance activities, combined with the risk of pipeline failure, would create a risk of increased sedimentation into watercourses and eventual destruction of fish habitat. The Big Loop Group argued Petro-Canada had not fully evaluated the risk posed by the Project to fish and it maintained that, although some streams in the Project area support populations of westslope cutthroat trout, it is not known which streams.

The Big Loop Group maintained that every watercourse in the area currently known to contain westslope cutthroat trout would be crossed by the Project, and that additional streams with the potential to contain the species would be crossed as well. It stated that the project would result in about six to eight different watersheds being affected, and that each one would have their carrying capacity for westslope cutthroat trout potentially diminished.

The Big Loop Group argued that the Board must take into account the larger picture in order to protect the public interest in its decision on these applications. Mr. Mayhood argued that it is important for the Board to consider that this species is not yet protected by legislation. He stated that westslope cutthroat trout are recognized as threatened by federal and provincial scientists, and the species is currently going through a process of being included in federal and provincial legislation as a threatened species.

Mr. Fitch pointed out that a team was being formed by SRD in order to develop a recovery plan for westslope cutthroat trout, and that two of its witnesses, Mr. Mayhood and Mr. Fitch, would be on that team. He submitted that the recovery plan will likely identify critical or important habitats for all life stages for westslope cutthroat trout, and may also identify broader landscape conditions needed to maintain water quality and flow characteristics, particularly during winter low-flow conditions.

The Big Loop Group also pointed out that the possible presence of westslope cutthroat trout in headwaters streams was not disclosed to the Board prior to November 6, 2008. It stated this update was released three weeks after Mr. Mayhood's report was provided to the hearing parties on October 14, 2008. It argued that having this information prior to determining a preference for the Eden Valley route should have influenced and altered Petro-Canada's route and site decision-making process.

[2] Pattendon, R., Miles, M., Fitch, L., Hartman, G., and Kellerhals, R., 1998, "Can Instream Structures Efficiently Restore Fisheries Habitat?" in Brewin, K., and Monita, D., eds., *Proceedings of the Forest Fish Conference, May 1996, Canadian Forest Service Information Report NOR-X-356*, pp. 1-11.

Mr. Mayhood stated that based on a watershed analysis that he was involved with approximately ten years ago, the current source of habitat degradation is almost exclusively due to linear developments, especially seismic lines, roads, and trails. It was determined that the four examined watersheds were at moderate risk of damage from the combined effects of increased peak flows and increased sediment delivery to streams. About half of those disturbances appear to be related to oil and gas activity or coal exploration.

The Big Loop Group argued that these problems were watershed-wide, and that they could not be corrected by working strictly in the channels alone. It argued the only way to proceed with this kind of development would be in stages, whereby completion of and clean up of each watercourse crossing would be necessary prior to proceeding with the next. It argued that Highway 532 is a major source of sediment in Johnson Creek, stating that the highway has confined the creek channel, effectively focusing and steepening the waterway, and has been washed out by the creek several times.

The Big Loop Group also expressed specific concern as to the suitability of the 10-25 well site, both from a wildlife habitat perspective and due to the fact that it would be 77 m from Flat Creek, which supports westslope cutthroat trout. It pointed out that an ephemeral drainage was rerouted around the pad site during initial site development in the 1970s.

8.2.2.2 Adderson

Adderson argued that *IL 93-09* requires consideration of overall effects, and so it is necessary to look at all applicable policies and legislation when evaluating an area of this sensitivity. It pointed out that the *Water for Life* strategy, led by AENV, lists healthy aquatic ecosystems as one of its pillars. It added that other government departments, such as SRD and Alberta Energy, are part of the development and the delivery of the *Water for Life* strategy.

Adderson argued that recovery efforts require the maintenance of existing populations and habitats to ensure fish populations are viable and can expand to occupy previous ranges. While Petro-Canada has proposed offset opportunities, it argued that nothing can offset the permanent loss of a major part of this subspecies in this area.

Adderson's witness, Mr. Fitch, maintained that Petro-Canada's EA was very limited in scope and scale. He argued that fish occupy stream networks rather than specific sites, and that the EA lacked standardized measurements of stream classification or riparian health inventory as an aid to designing a mitigation strategy. He submitted that useful information which would have served to guide the impact assessment and enabled Petro-Canada to provide a reasonable prediction of effects would have included fish population sizes and the distribution of those populations within all of the affected watersheds, not simply just present a presence and absence of information on those matters. He argued the EA should have included an understanding of how those populations use habitats on a seasonal basis throughout the watershed, and an analysis of the likely trajectory of those populations given the possible effects of the Project.

Adderson further argued that the EA failed to identify benchmarks of unaltered landscapes. It submitted that small amounts of sediment might be considered natural and that aquatic invertebrates and fish have evolved with those low levels of sediment, but that higher levels of sediment result in negative impacts on fish and other aquatic resources. It argued that the effects of sediment are constantly understated in the EA. The SFS, which included the Project area,

indicates that background levels of sediment in the regional study area are two and a half times greater than background levels reported in the EA.

Adderson's witnesses explained that aquatic system impacts flow downhill, and are not often localized as is sometimes characterized in the EA. Adderson argued that Petro-Canada demonstrated a consistent inability to understand the importance of small streams throughout the EA's study area.

Adderson expressed concerns regarding the chance for a long-term, undetected slow leak underneath a watercourse in the headwaters region. It argued that, based on provincial statistics and the estimated 40-year life span of the Project, the trunk line would be likely to experience three leaks during its operational life.

Adderson argued that the Project would likely contribute to long-term effects on fish habitat in the area, and that impacts would occur at a watershed scale. It argued that although the footprint of the Project is small, it has a disproportionately large effect, particularly in terms of sediment transport. It submitted the trunk line would be installed in erosion-prone soils and would go through a hilly area, thereby magnifying the impacts of disturbances.

Adderson argued that Petro-Canada's geotechnical work showed that it could not use HDD at two streams identified as sensitive (Johnson and Bear Creeks). It pointed out that at other watercourse crossings, in the event that construction of a directionally-drilled crossing was not feasible or was unsuccessful, Petro-Canada stated an isolated open-cut crossing would be constructed. It also pointed out that a high number of the streams that could be crossed with isolation or open cut methods have westslope cutthroat trout populations. It pointed out that at crossing numbers 38 (Bear Creek) and 41 (Greenfeed Creek) of its November 2008 Fisheries Update, both of which Petro-Canada proposes crossing with isolation or open cut construction methods, there may be an excessive amount of bare soil on a steep slope where sediment material could impinge upon the creek for an extended period of time, and that reconfiguration of either the stream banks or the upper terrace to accommodate the pipeline construction would be advantageous in both the short and long term.

Mr. Fitch argued that Petro-Canada had not provided empirical evidence to show that proposed mitigations have been effective in similar settings. He submitted that the Code expressly provided for consideration of impacts at a larger scale and the need to ensure these impacts are eliminated, minimized, and/or mitigated, as well as outlining minimum standards and construction practices. He argued that Petro-Canada's approach was not in keeping with the Code and stated that he had little confidence that impacts could be successfully managed, analyzed, or ameliorated.

Mr. Fitch argued that the monitoring measures proposed by Petro-Canada were not sufficient to identify sediment loading in watercourses and that it would be impossible to determine whether the proposed mitigation strategies would work unless comprehensive water quality sampling was done. He argued that the proposed monitoring should include water quality sampling over space and time in all the streams within the affected watersheds, both upstream and downstream of the pipeline ROW, as well as at the terminus of those streams.

Mr. Fitch also submitted that there was no indication that water quality monitoring would continue until the problems have been rectified. Erosion and accompanying sediment transport

can occur in watercourses over the lifespan of the Project and beyond, as long as its footprint persists on the landscape. He argued that only a comprehensive monitoring system would detect the cumulative effect of changes in water quality. Furthermore, he argued that Petro-Canada's sampling of watercourses did not include testing for benthic invertebrates, which are reliable indicators of habitat condition for trout, and can be sampled with relatively little effort.

8.2.2.3 The Pekisko Group

The Pekisko Group argued that the area where Petro-Canada's Project would be located is the life support system for southern Alberta and that if a disaster were to occur in the headwaters region and southern Alberta's fresh water was jeopardized as a result, there could be consequences from which Alberta may be unable to recover. It argued that in this area in particular, the ecological diversity creates an exceptional watershed and productive landscape.

The Pekisko Group also provided examples of existing issues with watercourse crossings in the area following the construction of roads. It pointed out that monitoring by Petro-Canada would not be able to prevent sedimentation damage to watercourses from a high flow event; it would merely monitor its occurrence.

The Pekisko Group maintained that the social and environmental impacts of this Project on the area would be too high and that, accordingly, the Project should not be approved.

8.2.3 Findings of the Board

The Board agrees that protection of present and future water sources is important for the province, and it recognizes the importance of mountain headwater regions in this regard.

The Board agrees that proper assessment and planning of all road and pipeline crossings, including those that may have been dry at the time of Petro-Canada's assessment, are integral to protecting the larger watershed as a whole. Key concerns regarding the crossings generally include maintaining water supply and water quality and protecting the aquatic habitat.

The Board is mindful that currently there are policy and regulatory mechanisms in place that are intended to protect the supply and quality of water in the province. At the provincial level, codes of practice have been developed under the *Water Act* to protect watercourses from sedimentation and deposition of other materials in order to protect aquatic habitats. The Board notes the evidence of Mr. Fitch, witness for the Big Loop Group, who testified that such codes are a minimum standard and there are times when this standard should be exceeded. Due to the potential risks to westslope cutthroat trout posed by the Project, the Board is of the view that the highest standards of diligence must be applied throughout all phases of the Project. The Board finds that these high standards of diligence include avoiding to the greatest extent possible disturbances to vegetation and soils adjacent to all watercourse crossings.

The Board is satisfied that Petro-Canada has assessed the watercourse crossings it has proposed in appropriate detail and that Petro-Canada understands the importance of the area to the province with respect to its watershed and fish habitat values. The Board finds that Petro-Canada has assessed each permanent watercourse crossing to determine whether it can be completed using open cut or isolation methods or whether it would require HDD.

The Board is mindful that DFO has stated that Petro-Canada's proposed watercourse crossing methods do not pose a significant risk to fish or fish habitat in the watercourses to be crossed by the Project. However, it is unclear to the Board as to what extent AENV or SRD has reviewed the Project to determine if provincial *Water Act* approvals will be required. The Board notes that Petro-Canada is confident that the Project can be constructed pursuant to the Code's requirements.

The Board agrees with the interveners that Petro-Canada may have understated several of the risks associated with the Project and that it did so partially on the assumption that its proposed mitigations will be completely effective. The Board is particularly concerned with the potential of the Project to affect populations of westslope cutthroat trout and bull trout. The Board is also particularly concerned that the trunk line will intercept watercourses that support a significant proportion of the provincial population of westslope cutthroat trout. Although unlikely, the Board is of the view that it is possible that a severe weather event could cause significant sedimentation of trout habitat, which could negatively impact those populations.

The Board notes that both Petro-Canada and the interveners agreed that some degree of siltation is natural in watercourses in the area and that sediment loads therein have increased substantially above historical background levels as a result of human activity. The Board is influenced by witnesses for the interveners, namely Mr. Mayhood and Mr. Fitch, who gave evidence that even small increases in sedimentation above background levels can have significant effects on fish habitat quality and that it is unknown how much sedimentation in watercourses increases as a result of individual disturbances because these increases have not been objectively measured.

The Board agrees and is of the view that with respect to the Project, monitoring should not be restricted to sediment loads, but should also include monitoring of the biological effect of any changing sediment loads in watercourses in the Project area. Although the Board accepts that monitoring of benthic invertebrates is a good indicator to evaluate effects of changing water quality, the details of this type of monitoring must be developed to the satisfaction of authorities such as AENV, SRD, and DFO.

The Board is concerned that there is potential for erosion-prone soils in the Project area to contribute to watercourse sedimentation. The Board recommends to AENV that it should review all watercourse crossings to confirm that appropriate crossing methods and timing are being applied and to determine if *Water Act* approval is required.

The Board is of the view that monitoring of watercourse sedimentation occurring as a result of the Project is critical to evaluating and preventing or mitigating its effects. This monitoring should be conducted by Petro-Canada regularly, even during extreme climatic events, and should incorporate adaptive management principles to address any watercourse sedimentation. To that end, the Board recommends to SRD that it require Petro-Canada to prepare and submit, to SRD's satisfaction, a watercourse sedimentation monitoring plan that outlines Petro-Canada's proposed methods to prevent or mitigate sedimentation in the construction, operational, and closure phases of the Project.

The Board also recommends to SRD that it consider requiring Petro-Canada to conduct riparian health assessments at all of its proposed watercourse crossings and submit this information to SRD. The Board is of the view that this information could be considered by SRD in issuing surface dispositions, as it would be useful when applied to Petro-Canada's monitoring efforts to

assess recovery and reclamation of riparian systems. The information would also aid in identifying areas where habitat or watershed compensation efforts could be focused.

Petro-Canada has committed to restoring other watercourse crossings that are in poor condition, in addition to its own crossings. The Board is of the view that Petro-Canada should engage in this approach to ensure that there is, at a minimum, no net increase in the amount of sediment in streams that support westslope cutthroat trout. Any habitat enhancement as part of these restoration efforts should be aimed at providing long-term improvement in habitat conditions for trout. Mr. Fitch testified that restoration efforts do not need to be restricted to the channels of watercourses, but could also include any activity that reverses habitat degradation in riparian areas or that contributes to improvements in stream flow or water quality in the watersheds affected by the Project. The Board also notes that Petro-Canada has committed to improving the habitat and bank conditions at Johnson Creek at Highway 532 as part of its fuel gas pipeline replacement.

The Board also notes that specific locations where habitat enhancement projects could be focused were identified by Mr. Fitch, specifically Johnson Creek adjacent to Highway 532 and Greenfeed Creek where the trunk line would cross it, and encourages SRD and DFO, as the responsible authorities for fish and habitat management, to consider these suggestions.

The Board is aware that since the close of the hearing, westslope cutthroat trout has been listed under Alberta's *Wildlife Regulation* as endangered. As such, the Board is confident that SRD will take this fact into consideration when issuing surface dispositions. The Board also recognizes that recovery planning for westslope cutthroat trout is underway and expects that Petro-Canada will assist in implementing these plans.

8.3 Groundwater – Adderson Spring

8.3.1 Views of the Applicant

Petro-Canada argued that although Adderson expressed concerns regarding groundwater, no intervener provided an expert witness to present evidence relating to potential groundwater impacts as a result of the Project. It also pointed out that the spring that supplies Adderson's residence and ranch is some 1.8 km from the proposed location of the central facility.

Petro-Canada stated that although it did not conduct a groundwater study, it did conduct a soils assessment, including an analysis of soil permeability, at the proposed central facility site. The assessment showed that the permeability of the soil at the site is in the 10^{-6} m/s range. Using topographic gradient, Petro-Canada concluded that the maximum groundwater velocity in the area of the central facility would be in the order of 50 m/year. As a result, Petro-Canada submitted that it would take several decades for the spring to experience impacts of groundwater contamination in the event of groundwater impact at the central facility site.

Petro-Canada stressed that impacts on groundwater at the site would be unlikely in that, in keeping with its policy of "nothing hits the ground," it planned to store all fluids at the central facility according to ERCB guidelines and use interstitially monitored double-walled storage tanks.

At the hearing, Petro-Canada committed to installing a series of eight or nine sentinel groundwater monitoring wells on and surrounding the central facility. It stated most of these wells would monitor shallow groundwater, while two would monitor deeper groundwater. It submitted that it would use this network of sentinel wells as an early groundwater contamination detection system, as the wells would be the first reception point for any groundwater contamination. If such an event were to occur, Petro-Canada stated that it would then be able to move quickly to remedy the situation, as needed.

8.3.2 Views of the Intervener

8.3.2.1 Adderson

Adderson submitted that the groundwater near his lands and residence recharges upslope and then flows downslope, discharging to the surface at a spring located on a slope behind the Adderson residence, which also feeds a surface creek located next to the Adderson residence. It then runs through eleven pastures, pens, or corrals and through two barns before it makes its way to the Highwood River. Adderson argued that the spring, which flows all year, is the lifeblood of the Adderson ranch, as all of its drinking water is drawn directly from the spring and does not require treatment.

Adderson argued that Petro-Canada's EA did not assess how the central facility may impact the groundwater and surface water resources Mr. Adderson relied upon. Adderson testified that its concerns regarding his water supply were well known to Petro-Canada, which took no steps to allay them. In response to Petro-Canada's proposal during the hearing to use of sentinel wells, Adderson agreed the wells may be able to detect groundwater contamination.

8.3.3 Findings of the Board

The Board recognizes the importance of the protection of groundwater supplies and the importance of groundwater to Adderson's residence and ranching operation. The Board notes Petro-Canada's proposed network of sentinel wells and mitigation strategies to reduce the risk of groundwater contamination in the Project area.

The Board is of the view that in keeping with environmental and public safety objectives and requirements for industry, the prevention by approval holders of spills and other events that could impact groundwater at or near their projects through careful operations, strict adherence to storage requirements, and regular, diligent monitoring is both crucial and integral to the responsible development of resources and the protection of the public interest.

The Board accepts that if the proposed measures are properly implemented, the risks created by the Project to groundwater and the spring supplying Mr. Adderson's residence and ranch will be minimal. In addition, the Board is of the view that the proposed sentinel wells, if carefully located and monitored, will provide a means for early detection of groundwater effects at the central facility site. The Board directs that Petro-Canada provide a plan for the Board's approval for the installation and monitoring of the wells.

8.4 Vegetation

8.4.1 Views of the Applicant

Rare Vegetation and Vegetation Communities

Petro-Canada indicated that its rare plant surveys were adequate and that it followed the Alberta Native Plant Council's Rare Plant Survey Guidelines. It identified a 10 km section of the trunk line route that was minimally surveyed due to access restrictions. It completed additional surveys after the filing of the EA.

Petro-Canada stated that it completed rare plant surveys between June 7 and 14, 2006, and between August 15 and 25, 2006. The latter survey included some additional sites as portions of the proposed pipeline had been rerouted. Petro-Canada also informed the Board that the August surveys focused on the current route, and that, in order to cover the sites that were not visited in June 2006, it went back to the field in June 2007.

Petro-Canada noted that a rough fescue/hairy wild rye community was the only rare plant community on the proposed trunk line route and is located immediately south of Highway 532 on the slope above Jonhson Creek in the subalpine natural sub-region. Petro-Canada indicated that there are 15 recorded locations of this community in Alberta spread along the Foothills in the subalpine sub-region. It explained that this area of rough fescue/hairy wild rye could not be avoided and would be reduced in area by the construction of the pipeline ROW. Petro-Canada stated that there is an existing fuel gas line through this vegetation community and that this line has already created a disturbance within the rare ecological community. As well, the ROW has been used by off-highway vehicles for recreation.

Petro-Canada stated that construction through this area would be conducted in consultation with the appropriate environmental inspector. In the event that Petro-Canada found it necessary to widen the existing ROW to accommodate the trunk line, one of the mitigation techniques that it contemplated would be to try to salvage as much of the existing fescue as possible from the area that would be disturbed, with the intent of re-contouring the slope to a more natural gradient. It indicated that the fuel gas ROW has not been re-contoured or reclaimed very well following original construction approximately 40 years ago. Petro-Canada further indicated that construction of the trunk line would provide an excellent opportunity to abandon the existing fuel gas pipeline and re-contour the slope to a more natural grade. Petro-Canada indicated that it would take this opportunity to physically plant fescue grass plugs back in on the existing fuel gas ROW as part of reclamation, as well as on the trunk line ROW to try to reestablish the vegetation to a more natural condition than at present.

During its surveys, Petro-Canada found limber pine (*Pinus flexilis*) along the road to the well sites at 7-7 and 8-7 in the gathering system. It found over 50 trees in that area, 15 of which would be in the footprint of the Project. Limber pine is on the tracking list of the Alberta Natural Heritage Information Centre (ANHIC) due to threats from white pine blister rust fungus. Petro-Canada said that it would avoid taking out limber pine to the greatest extent possible.

Petro-Canada also identified spoon-leaf moonwort (*Botrychium spathulatum*) along the trunk line ROW alongside Highway 532, in the sub-alpine region just before its maintenance yard. This species is listed as S2 in Alberta, indicating that there are six to 20 known locations of

occurrence in the province. Petro-Canada indicated that it would do everything in its power to avoid disturbance to this population, bearing in mind conditions at the time of construction. It also indicated that it believed that it could avoid this population through appropriate measures for that particular portion of the ROW. Petro-Canada indicated that if avoidance was not possible, it would use ditch-only soil stripping in combination with pre-welding pipe, followed by having it pretested and pulled into the ditch in order to narrow the ROW as much as possible. Petro-Canada indicated that if it could not avoid disturbance of the spoon-leaf moonwort it would offer compensation that would potentially consist of further study focused on the particular species in question in order to add to its value wherever else it might exist in the province.

Weeds

Petro-Canada stated that it has conducted weed surveys of both the trunk line and the gathering system and that it has a good knowledge of where the weeds are located throughout the Project area. It said that it found weeds and nonnative invasive plants at 67 of 81 inspection sites. It found that throughout the Project area, especially at lower elevations along creeks and in meadows, weeds and invasive plants were abundant. Petro-Canada was of the opinion that, as with any construction Project, there is the potential to introduce undesirable plant species.

Petro-Canada noted that timothy, Kentucky bluegrass, and smooth brome are invasive forages commonly found in grassland and deciduous forested areas. Petro-Canada made it clear that it is committed to managing weeds during all phases of the Project by ensuring that all the equipment is cleaned prior to entering the site, and keeping it clean while on site. It has developed a weed control plan that addresses how it will construct and operate the Project to prevent the spread of weeds. It stated that it would spray noxious weeds whose spread must be prevented as a requirement of the *Weed Control Act*. It said that it would monitor weeds throughout the entire operational phase of the Project and that it would use appropriate control methods.

Reclamation and Grasslands

Petro-Canada acknowledged that localized portions of the Project would encounter sensitive fescue grasslands and soil conditions that could pose greater reclamation challenges. It was of the view that it developed technically sound and defensible detailed site-specific reclamation strategies through the use of local soils and vegetation information, matched with appropriate and innovative reclamation techniques. This, according to Petro-Canada, would require frequent monitoring and possible adjustments to its management strategy. Petro-Canada stressed that its reclamation program would meet or exceed the requirements of AENV's *A Guide to Reclamation Criteria for Wellsites and Associated Facilities* (2007) and *Revegetation Using Native Plant Materials* (2003). It stated that its goal would be to return the land to a state of equivalent capability, and as closely as possible to match predisturbance conditions.

With respect to native fescue grassland areas, it submitted that its proposed development avoided grasslands to the greatest extent possible. Less than six per cent of the PDA would traverse native grassland vegetation, and less than three per cent of the total Project area would affect grasslands where fescue is the dominant species.

Petro-Canada committed to narrowing its pipeline ROW in areas of rough fescue to the extent possible. In addition, it committed to using ditch line stripping only in areas of rough fescue when its construction timing coincided with dry or frozen conditions. Petro-Canada could not

commit to conducting its construction through rough fescue areas in dry or frozen conditions for the entire pipeline, as construction of the south portion of the trunk line was planned for the late summer and fall. It explained that this was due mainly to safety concerns regarding the steep side slope on which the fescue area is located.

Petro-Canada said that it understood the complexities associated with establishment of native plant communities, and acknowledged that there is still a lot to be learned about the reclamation of native grasslands, particularly where rough fescue is predominant. It was committed to spending the time and resources necessary to reclaim the grassland areas. With respect to fescue grasslands, it intended to use fescue plugs grown by a contractor in a greenhouse from seed that is locally collected. Petro-Canada indicated that it had contracted for 150 000 plugs to be raised for reclamation in the Project. The fescue plugs would be the approximate size of a two-year-old plant. Petro-Canada argued that this would allow the plants to be competitive with invasive species at the time of initial revegetation, so that better establishment is expected. In its view, fescue plugs represented the best possible method for the reclamation of rough fescue grasslands. Petro-Canada submitted that in work done by Compton Petroleum in the region on similar sites as part of PhD research being conducted through the University of Alberta, plugs had been shown to be much more successful than seeding of rough fescue, which had yielded inconsistent results, especially where invasive species were prevalent.

Petro-Canada submitted that its work with fescue reclamation in the Eastern Slopes would be used to contribute to ongoing research into native foothills grassland restoration in Alberta. In Petro-Canada's view, the application of the latest technology for the reclamation of native grasslands, combined with the learnings shared and applied to other unrelated restoration projects, would benefit rangeland users and watershed protection.

8.4.2 Views of the Interveners

8.4.2.1 The Big Loop Group

Rare Vegetation and Vegetation Communities

The Big Loop Group indicated that the rare plant community issue is one of lack of planning, as surveys for rare plants and vegetation communities were not completed until after a route had been determined. This allows only site-level mitigation and does not allow for avoidance through routing.

Much of the evidence by the Big Loop Group regarding rare plants and vegetation communities of conservation interest was provided by its expert witness, Cheryl Bradley. Ms. Bradley stated that the EA was short on details about the focus and intensity of the survey effort. She argued that it appeared that most of the effort was directed to more easily accessible areas, and indicated that to do an early and a late season search for rare plants one would need to go back to the same sites on both of those occasions, which Petro-Canada did not do. She argued that it appeared as though most of the focus was along Highway 532 and north of Highway 541, and that therefore Petro-Canada did not undertake complete coverage of the Project area.

Ms. Bradley further stated that in addition to rare plant surveys, Petro-Canada undertook range assessments rather than detailed range inventories. The Big Loop Group indicated that range

inventory procedures are much more detailed and would be more useful in terms of monitoring changes in the health of vegetation communities over time.

The Big Loop Group noted that Petro-Canada completed riparian health assessments at ten sites. Four of those sites were on North Twin Creek, which parallels Highway 532, one on Corral Creek, which is just north of Highway 532, and two at Greenfeed and Salt Creeks. It stated that Petro-Canada found two sites healthy, four healthy with problems, and four unhealthy. The EA stated that the degraded health is due to grazing pressure at five sites, exacerbated by recreational off-road vehicle use at three of the sites, but did not provide information as to why these particular sites were chosen for riparian health assessment. The Big Loop Group argued that it would be useful to provide a context in the EA to indicate why only ten riparian health assessments were done, and to describe how that information would be used in the Project.

Ms. Bradley noted that about a third of the local study area, based on the information provided in the EA, contained vegetation types with a high conservation interest or sensitivity to disturbance. This included native montane and subalpine grasslands (13 per cent of the Project footprint), riparian communities along drainages and seepage areas (13 per cent of the Project footprint), and old growth forest (seven per cent of the Project footprint). The Big Loop Group also indicated that limber pines are located in rough fescue grasslands so effects on rough fescue have been understated, and that the limber pine community is also on the tracking list of the ANHIC for rare communities. It also stated that Petro-Canada had not identified this fact. According to the Big Loop Group, limber pine is known to be at risk because of a disease that has been introduced into North America that is killing pines. It stated that there is a provincial status report for the species and maintained that Albertans need to all work together in an effort to make sure that the province does not completely lose limber pine woodlands.

It pointed out that old growth forests are generally considered of conservation interest in the Eastern Slopes due to the restricted distribution and the different biodiversity that they have.

Ms. Bradley noted that the EA provided a list of 205 rare vegetation species that could potentially occur in the headwaters region. She indicated that the list was not a reasonable tool for a properly focused rare plant survey as it was far too extensive, including species that occur only in other regions of Alberta.

Ms. Bradley noted that Petro-Canada had not surveyed nonvascular species. She expressed concern for the potential for rare nonvascular species to exist in the area of the Project, species that may be important components of biodiversity. Furthermore, the Big Loop Group argued that Petro-Canada identified four rare plants, but that it had not identified sagebrush buttercup (*Ranunculus glaberrimus)*. The Big Loop Group was of the opinion that it should have been listed because it is on the rare plant tracking list. Ms. Bradley argued that limber pine and the spoon-leaf moonwort would be adversely affected by the Project, and that she could not be certain about the shrubby beardtongue and the early buttercup species.

Weeds

The Big Loop Group noted that Petro-Canada's EA went into detail to identify the nonnative species it encountered, but that there was very little information on the distribution of those species or about how they are related to ecological factors or to land use. The Big Loop Group

was of the opinion that this information would be useful in better understanding the risk associated with the Project in terms of advancing nonnative species in the area.

Ms. Bradley argued that range plot data and riparian health plot data collected by the provincial government have shown that the foothills, parkland, and montane areas are very susceptible to invasion by aggressive nonnative agronomic species such as timothy and smooth brome. She raised concerns about these invasive species aggressively encroaching on disturbed sites, and the ability for Petro-Canada to prevent that and to restore disturbances to native vegetation communities. She stated that invasive species are a particular challenge in this foothills environment, and that there is ample literature to demonstrate that any time a habitat is fragmented the risk of nonnative species invasion increases. Further to this argument, the Big Loop Group stated that existing corridors should be used wherever possible.

The Big Loop Group expressed concern that one can have plans and good intentions to clean equipment and to try to prevent the spread of undesirable vegetation, but that it is logistically very challenging. It affirmed its position that even if Petro-Canada was successful in thoroughly cleaning any construction equipment that was to enter the headwaters region, once it is on site, the equipment may still be exposed to nonnative species. As a result of this, the Big Loop Group argued that it would be very hard to prevent the continued spread of weeds. As a result of ongoing use of roads and pads and consequent weeds in ditches, the Big Loop Group stated that it is unlikely that native vegetation would be restored in Project-disturbed areas.

Ms. Bradley submitted that disturbances could cause a shadow-effect as well. She explained that when one disturbs native vegetation and soil, some nonnative species will establish, and once established move gradually off that disturbance to invade native vegetation communities. If cattle or other ungulates eat the nonnative forages, then the seeds are spread even farther. The Big Loop Group argued that the effect of cattle would be evident along linear disturbances where cattle wander, and this would be expected anywhere that it is easy for them to travel, including along riparian areas.

Reclamation and Grasslands

The Big Loop Group said that Petro-Canada's mitigation and reclamation measures were not well documented and could not guarantee restoration of native vegetation communities.

Specifically, Ms. Bradley submitted that in the southern foothills region the public is already concerned about the amount of impacts and loss of grassland environments. She noted that there was no supporting documentation or data provided by Petro-Canada to demonstrate that rough fescue could be successfully reclaimed in these environments. From the Big Loop Group's viewpoint, the use of fescue plugs represented another unproven reclamation/mitigation technique that should not be experimented with in this sensitive environment.

8.4.2.2 Adderson

Weeds

Dr. Stelfox stated that there has been about a 60 per cent loss of native fescue grasslands in the SFS area and, according to the study area model, the area will continue to experience loss at a slow incremental rate. He was also of the opinion that this fact was even more of a concern if one

were take into account the expansion of exotic invasive plants that are moving into these native grasslands due to the influence of roads and crop lands.

8.4.3 Findings of the Board

The Board notes that Petro-Canada identified several rare plant species and a vegetation community along the trunk line ROW. The Board also notes that the interveners were of the opinion that impacts on rare plant and vegetation communities as a result of the proposed Project would be due to, among other things, a lack of planning and a deferral to site-specific planning. The Board further notes that the interveners believed that Petro-Canada should have completed more extensive and comprehensive rare plant surveys, including surveys for nonvascular species, and more riparian health assessments, and it should have conducted detailed range inventories at appropriate sites.

The Board is of the view that there are no specific requirements for vegetation sampling related to energy development projects that do not require an environmental impact assessment under the *Environmental Protection and Enhancement Act*. Although it is not clear to the Board to what extent SRD has required this information in its surface disposition processes, the Board is of the view that management of biological diversity is the responsibility of that agency. The Board notes that the public lands disposition for the portion of the trunk line that supports the rare plant and rare vegetation community has already been approved by SRD. The Board is confident that the presence of rare plants and proposed mitigations were considered by SRD prior to issuing that disposition.

The Board is aware that since the close of the hearing, the limber pine has been listed as an endangered species under Alberta's *Wildlife Regulation*. The Board understands that this will invoke a process of protection and recovery planning that has yet to unfold. The Board expects that Petro-Canada will work with SRD to determine proper mitigation measures or compensation to support the recovery plan once it is complete.

The Board notes Petro-Canada's commitment to employ construction methods that would allow it to narrow its trunk line ROW as much as possible during construction of the proposed Project in order to minimize disturbance to the spoon-leaf moonwort population. The Board directs that this commitment be reflected in Petro-Canada's EPP, including the Construction Alignment Sheets.

The Board also notes Petro-Canada's commitment to reclaim its existing fuel gas pipeline along Highway 532. The Board directs Petro-Canada to initiate reclamation immediately following abandonment of the line. It also expects that Petro-Canada will apply for and obtain a reclamation certificate as part of its process. The Board recognizes that there is no regulatory time limit for this to occur, yet encourages Petro-Canada to begin the reclamation process as soon as possible.

The Board further notes Petro-Canada's commitment to meet all provincial and municipal weed control requirements. The Board points out that jurisdiction for weed and pest management falls with municipalities and Alberta Agriculture and Rural Development on private lands and SRD on Crown lands.

The Board is of the view that Petro-Canada will need to engage an aggressive plan for monitoring and eradicating weeds and invasive nonnative forages throughout the Project area. This is a particular concern relating to new project disturbances, such as the trunk line, and new portions of the gathering system, as well as along existing access roads. The Board directs Petro-Canada to have an environmental inspector on site at all times during construction of the proposed Project who is capable of identifying weeds and invasive agronomic species. Petro-Canada must maintain a weed control program during all phases of the Project. Monitoring for weeds must be a component of the ongoing environmental management of the Project until such time as the Project is abandoned and reclamation certificates have been obtained.

The Board agrees that the best mitigation measure to reduce impacts to native grasslands is avoidance. The Board notes that in the subject case, a small portion, less than six per cent of the PDA would traverse native grassland vegetation, and less than three per cent of the total Project area would affect grasslands where fescue is the dominant species. If avoidance is not possible, the Board is of the view that serious steps must be taken to minimize disturbances as much as possible. Therefore, the Board accepts that after considering several route corridors, Petro-Canada selected an option that minimizes disturbances to native grasslands and native fescue grasslands in particular.

Along the trunk line, the Board accepts Petro-Canada's plan to narrow the ROW and use ditch line stripping only in certain conditions. The Board is of the view that predevelopment planning and design, if properly conducted, should minimize environmental impacts, reduce costs for site reclamation, and decrease the risk of incurring long-term environmental liability.

The Board is of the view that in addition to minimizing disturbance at the outset, successful reclamation is an appropriate means to deal with native prairie landscapes. The Board recognizes the challenges and risks specific to and inherent in reclaiming rough fescue. Although Petro-Canada is optimistic about the potential for plugs to aid in fescue grassland reclamation, the Board is cognizant that this is an unproven methodology that will require further testing and development. The Board is mindful that, if the approach is not successful, Petro-Canada will still be responsible for reclaiming Project disturbances to the satisfaction of all applicable requirements and criteria at the time of abandonment.

Although reclamation is not formally required until the time of abandonment, the Board encourages Petro-Canada to reclaim temporary and pipeline ROW disturbances as soon as possible following construction, to the extent they are not needed for operations and emergency access. In addition to rapid reclamation, this would decrease environmental risks and allow evaluation, and adaptive management, of reclamation practices.

8.5 Wildlife

8.5.1 Views of the Applicant

Grizzly Bears

Petro-Canada submitted that it evaluated the potential effects of the Project on grizzly bear spring habitat and grizzly bear mortality. In evaluating the significance of Project effects, the EA predicted that the magnitude of effects on spring habitat availability would be moderate, local in geographic extent, medium in duration, and that there is a high likelihood that these effects will

occur. Petro-Canada's EA rated the Project's environmental consequence of spring grizzly bear habitat loss as low.

Petro-Canada characterized the Project-related increase risk on bear mortality as high, regional in extent, and long term. It rated the environmental consequence as moderate.

Petro-Canada evaluated changes to grizzly bear habitat availability using a Habitat Suitability Index (HSI) model for the spring season only, as it was of the opinion that that this was the most limiting season. The model was based on generally known habitat preferences of bears, and where those habitats tend to occur on the landscape. It indicated that it would be possible to develop models for other seasons if necessary. In response to intervener criticisms of its modelling approach, Petro-Canada explained that only recently have collared bears been used to develop newer Resource Selection Function (RSF) models, which predict the probability of a bear occurring in or using a certain location. Petro-Canada stated that it did not have any radio-collared bear data from the great majority of the local study area assessed in its EA on which to base an RSF model. Petro-Canada indicated that it did have maps based on RSF models for spring, summer, and fall baseline conditions from the Foothills Research Institute (FRI). Petro-Canada explained that the FRI did not have an RSF model that could assess changes to baseline information available prior to filing the EA.

Although an initial RSF model was available from the FRI, Petro-Canada chose not to use this model because the model was based on very few animals that were collared and relocated in the Project area, there was going to be additional collaring in the area, and there had subsequently been a revision to the RSF model. It indicated that the new RSF model was not available at the time that the EA was prepared.

Petro-Canada stated that it used the FRI's mortality risk model to estimate changes to risk of mortality to grizzly bears as a result of the Project. It explained that mortality risk values produced by the model do not actually reflect the percentage of the bear population that might be lost due to human-related mortality. Rather, it is a probability risk assessment that estimates whether or not a Project-related bear mortality would be likely to occur. The model used road density as an indirect measure of mortality risk. Petro-Canada indicated that it made a minor modification to the model in consultation with the Alberta Grizzly Bear Recovery Team because the FRI model had not accounted for trails and closed gated roads in terms of assigning risk.

Petro-Canada stated that it conducted no specific surveys to determine use of the Project area by grizzly bears. It indicated that field surveys typically would not focus on grizzly bears because of their low population density. Bears are a wide-ranging species that occur at very low densities, so the probability of detecting bears during sampling was very remote. Petro-Canada argued that the estimated grizzly bear population in the area between Highways 1 and 3 is 90 bears (about 11.77 bears per 1000 km^2). It indicated that the population level between Highways 1 and 3 was not of particular relevance because it used a habitat-based assessment of habitat loss, and then applied the FRI mortality risk model to gain an understanding of how mortality risk would change. Petro-Canada stated that the objective was to assess the capability of the land base to support the species and also the relative risk of mortality to grizzly bears using that land base.

Petro-Canada said that it had undertaken a pre-den grizzly bear survey in conjunction with SRD and believed that it was appropriate to identify any den areas within the vicinity of the gathering system and the trunk line.

During examination, Petro-Canada indicated that the Government of Alberta had released a grizzly bear recovery strategy that identified a number of grizzly bear conservation areas (GBCAs). These areas would be managed for the long-term sustainability of the species. The Project falls within the Livingston GBCA, although the trunk line would be near the eastern periphery. Petro-Canada expressed the view that it is not the intent of the recovery strategy to exclude industrial and other land-use activities from these areas, however, activities will have to be conducted under the guidelines presented in the recovery plan. Petro-Canada indicated that the fundamental issue is whether the Project could proceed and be compliant with the recovery plan. A key management tool in the strategy is an open road density threshold of less than 0.6 km/km^2 in order to maintain secure habitat and reduce mortality risk. Existing open access densities within the local and regional study area currently fall well below this value. It was Petro-Canada's position that the Project would not cause a measurable increase in open access density, and therefore would comply with the strategy's guidelines and intent.

Petro-Canada stated that the Project would change the density of restricted roads and trails. Its EA predicted that during construction and drilling, the area of very high mortality rate would increase by almost 10 per cent and the area of high mortality rate would increase by 5.4 per cent. Petro-Canada did not view this change as significant and believed that there would be a low likelihood of Project-related mortality to bears because of the mitigation and access control measures that would be implemented. Petro-Canada's position was that there would be no changes to mortality risk in terms of the long-term sustainability of bears in the area, even though there could be an incremental increased risk to bears with this Project. It indicated that effects would likely consist of a potential shift in the distribution of grizzly bears within the region, and possibly some change in abundance, but not to the degree that bears could not be sustained within the region.

In response to intervener concerns, Petro-Canada indicated that it had not completed an analysis of the combined effects of habitat loss and increased mortality risk. In its opinion, bear mortality risk was more associated with the use of linear facilities and was not related to habitat loss or change.

Petro-Canada indicated that it intended to look for potential habitat enhancement opportunities, which could consist of removing an existing old facility and returning it back to a habitat that may be suitable for grizzly bears.

Wolves

Petro-Canada explained that in February 2007, SRD informed Petro-Canada that the proposed trunk line route in the Willow Creek area was approaching two wolf dens and a rendezvous site. SRD had indicated that one den had been used in 2005 and the other in 2006. Petro-Canada indicated that since the rendezvous site had been used both years, mitigation measures would have to be incorporated into the construction of the trunk line.

Petro-Canada stated that the EA did not address the potential site-specific Project effects on wolves. It explained that instead, it developed a preliminary mitigation strategy that is included it in its EPP. To minimize potential effects on the den sites, it indicated that it intends to establish a restricted activity period from April 15 to July 15 within 1 km of any active den site.

It was Petro-Canada's understanding that attempts were being made to collar one or more wolves in the Willow Creek area to track their movements over the winter. Petro-Canada stated it would be willing to work alongside SRD to assist with the collaring program and to gain an understanding of movements and use of the area by wolves. Petro-Canada stated that if this information proved that a den was active in the area then further discussions would be held with SRD on appropriate restricted activity periods and buffers to minimize disturbances to the animals.

Petro-Canada noted that actions were taken by the Alberta government on this wolf pack in 2004 to remove six individuals due to livestock predation issues in the area. It stated that it was aware of the fact that it has not been a completely unobtrusive relationship between the ranching community and wolves.

Petro-Canada indicated that large carnivores are not typically habitat selective, but instead develop a range and distribution based on where their prey base is located. When there is not good information on the pack movements or dynamics on which to base an assessment of potential effects on habitat suitability, then there is typically a focus on their major prey species like elk and moose, and that is the approach taken by Petro-Canada.

Petro-Canada maintained that wolves are not considered a species at risk by either the provincial or federal governments and that any person with a firearm in Alberta can legally shoot a wolf from the opening of any big game season right through to May 31 of the following year, even without a hunting licence.

8.5.2 Views of the Interveners

8.5.2.1 Adderson

Grizzly Bears

The interveners' position relating to the effects of the Project on grizzly bears was brought forward by Adderson and was discussed primarily by intervener expert Mr. Grant MacHutchon. Related evidence was provided by intervener experts Dr. Bruce Leeson and Dr. Brad Stelfox.

Mr. MacHutchon disagreed with the conclusions of the EA regarding the potential effects on grizzly bear habitat and mortality risk. He indicated that there were a number of significant weaknesses in the EA, including that it underestimated what the Project effects would be, as well as its contribution to cumulative effects. Three issues were raised from his review of the EA: modelling, mortality risk, and cumulative effects.

Mr. MacHutchon indicated that Petro-Canada's local study area was quite large, so that Petro-Canada's work underestimated the change to bear habitat and subsequent mortality risk. It was Mr. MacHutchon's position that Petro-Canada should have evaluated habitat change at a more localized level because this would be where the site-specific effects would occur.

Adderson disagreed with Petro-Canada that the environmental consequence on grizzly bears would be moderate. Mr. MacHutchon agreed with Petro-Canada that there were about 90 grizzly bears in the area between Highways 1 and 3. He estimated that, on a running average basis, 3.7 (3.5 to 4) bears are dying every year in the local population from human causes since legal

hunting ceased in 2006. He expressed the opinion that even with no hunting in this area, there is still a mortality level that comes close to or potentially exceeds what is considered to be sustainable by most grizzly bear experts for a population of 90 bears.

Mr. MacHutchon maintained that the HSI model used by Petro-Canada was not based on empirical data showing how grizzly bears use the local study area. Instead, it was based on a broader and more general understanding of habitat selection. Adderson was of the opinion that an RSF model was available through the FRI and that as a contributor to the FRI, Petro-Canada should have had access to the information and used the RSF model rather than an HSI model.

Mr. MacHutchon expressed concern that important research relevant to the Project area did not appear to have been used in developing the HSI model. He explained that there is a wealth of information relevant to the area on the ecology of bears available through two major research projects that are fairly current: the Eastern Slopes Grizzly Bear Project and the FRI work that has been ongoing in the Eastern Slopes since 1999. Furthermore, Mr. MacHutchon expressed concern that Petro-Canada did modelling for the spring season only, making it impossible to evaluate effects on summer or fall habitat. He indicated that fall is the most critical season to bears because that is when they put on the most weight in preparation for winter. Mr. MacHutchon was of the opinion that if the analysis considered the spring season only, then one might be destroying critical fall habitat without being aware of the fact.

Adderson argued that the potential mortality risks to grizzly bears in the EA were understated because Petro-Canada underestimated the amount of access that would be created and the subsequent increase in the number of people that might be accessing the area. Mr. MacHutchon stated that the projected 5.8 per cent increase in areas with high mortality risk would add up to a number of bears that could potentially die as a result of the Project. He postulated that even if only half a bear a year dies as a result of the Project, that would add up to a significant number of bears over the projected 40 year lifespan of the Project.

Mr. MacHutchon described two papers by Garsalis et al. on grizzly bear mortality in the region, and indicated that Petro-Canada considered only the first paper in its analysis. Subsequent to the period when the data was analyzed for the original paper there had been a high rate of female mortality, and the second paper suggested that mortality was above the rate that was sustainable for that population.

Furthermore, Mr. MacHutchon explained that the issue of habitat change would exacerbate the potential for mortality to occur because it would expose bears to a greater degree of interaction with humans. According to Mr. MacHutchon, Petro-Canada erred because habitat change and mortality risk should not be considered separately. Mr. MacHutchon noted that it would have been simple to compare both issues together as there was a process to do just that when the EA was being drafted. He indicated that products based upon the research from the FRI area were available in 2006 when Petro-Canada conducted its EA, including RSF maps, mortality risk maps, which were used in the EA but modified from the original model; and safe harbour attraction maps, which look at the integration of habitat change and mortality risk.

Mr. MacHutchon stated that the cumulative effects assessment conducted by Petro-Canada did not consider a full range of potential effects. While it recognized that forest clearings can create improved foraging opportunities, it argued that if bears come to forest clearings to feed and are therefore more susceptible to poaching, then improved habitat quality would be offset by the

potential mortality. All other land uses, in combination with the Project-specific effects, would add up to a number of influences on the grizzly bear population including loss of core security areas or habitat security as a result of increases to human access, displacement from areas of human activity, direct loss of habitat, potential habitat fragmentation, and increases in bear/human conflict created by attractants.

Mr. MacHutchon expressed the opinion that regional access management would have to be addressed in a comprehensive plan, and that Petro-Canada should take the lead role on this plan. He argued that a key assumption for a lot of bear management planning is that everybody will follow the plan, but submitted that this would not necessarily be the case. Consequently, there would need to be strict built-in controls, not only for access, but also for the activities of Project consultants or contractors.

Mr. MacHutchon indicated that he also had concerns with the 541/940 route. Being adjacent to the road, it could potentially be a source of increased risk with respect to grizzly bear mortality, and this risk could potentially be greater than that posed by the Eden Valley route. Regarding the Mazeppa route, Mr. MacHutchon indicated that bears also use areas to the east but not as much as in the foothills area associated with the Project, and even then mostly during early spring. A route going east as soon as possible, and out on to the grasslands and the farmlands heading towards Highway 22, would have less effect on grizzly bears.

Dr. Leeson indicated that two grizzly bears that were moved to Cataract Creek from the Bow Valley as habituated problem bears were legally harvested on the Eden Valley Reserve. This indicated that the likelihood of mortality of grizzly bears in this area is higher than stated by Petro-Canada.

Dr. Stelfox, on behalf of Adderson, expressed the opinion that Petro-Canada's Project would contain, by most grizzly bear ecologists' accounts, unacceptably high levels of mortality risk. He argued that bear habitat has been fragmented with highways, bears are struck by vehicles, there has historically been both a legal and illegal harvest, and key wildlife habitat has been replaced with recreational features like golf courses. All of these factors contribute to bear mortality rates. He stated that all of these considerations taken together result in the declining distribution and overall abundance of grizzly bears in the region, and estimated that bear mortality risk is currently about 60 per cent higher than during preindustrial times.

Dr. Stelfox indicated that RSF modelling reveals that the kind of footprint Petro-Canada would develop is actually highly desirable with respect to grizzly bears in terms of habitat quality and forage production. He stated that pipelines are generally good for grizzly bears in terms of creating foraging habitat, but that it is the increased exposure to human activities that would be problematic. He stated that there is a significant additive increase in mortality risk to grizzly bears, probably resulting in their regional extirpation in conjunction with other land uses.

During cross examination, Petro-Canada equated the mitigations planned for the Project to those incorporated into the TMX-Anchor Looping Project through Jasper National Park and Mt. Robson Provincial Park in British Columbia. Dr. Stelfox responded that putting an additional pipeline in a national park probably did not come along with a hunting community that would have the opportunity to shoot grizzly bears, and there is not a lot of gut piles of moose and elk inside of a national park since they do not allow hunting. So although they are both pipeline

projects they are not comparable, as a pipeline in a national park has effective access control while this Project will not.

8.5.2.2 The Big Loop Group

Wolves

Wolf experts Charles Mamo and Timmothy Kaminski presented evidence relating to wolf ecology and effects of the Project on wolves. They did not advocate complete protection of the wolves, but indicated that they were seeking a balance between keeping wolves on the landscape while protecting ranching operations. They noted that although ranchers have had trouble with wolves on past occasions, the existence of a pack has been tolerated within limits. They stated that ranching activities in the area currently incorporate methods to reduce potential interaction between wolves and livestock. They were of the opinion that the proposed trunk line construction could cause the displacement of wolves to other areas as the traditional dens are abandoned because of human activity and displacement of prey.

Mr. Mamo and Mr. Kaminski stated that the home range of the Willow Creek wolf pack is roughly bounded by existing roads that receive a fair amount of traffic and industrial activity throughout the year. They indicated that there are not many home ranges like the one occupied by this pack due to the fact that the area is unique in terms of its productivity and the diversity of wildlife that occupy the area. They described the headwaters area as a mix of coniferous and deciduous forest that is very high quality habitat for wildlife. The Big Loop Group's experts indicated that the majority of kills by wolves are deer, elk, and moose, but that cattle are also consumed, albeit that this may be from scavenging rather than from direct predation. The proposed route would cut through the rendezvous area and the natal area identified by SRD, which includes the whelping dens. They stated that wolves use this as a security area. The Big Loop Group noted that wolves use the area south of Highway 532 where there is off-highway vehicle use and a lot of disturbance, however stated that to its knowledge wolves have never attempted to den there.

The Big Loop Group's experts explained that the issue of habitat security is paramount as wolves need areas that are free from human disturbance, industrial activity, and roads to whelp successfully. They noted that the rendezvous area would be dispersed on the landscape rather than being a discrete site, but that portions would be within 500 m of the proposed trunk line route, and stated that there is a high degree of fidelity to this area as over the last ten years the pack has gone to the same home site. They noted that within the area identified as the home site there are currently four wolf dens. It was stated that wolves may alternate between dens, but that they come back to the same area because doing so provides them with security, prey, and water. They expanded that the area that incorporates wolf dens is a system more than any specific locale. The trunk line will affect not only the wolves directly, but probably some of the other wildlife that is inherently related to whether or not those wolves stay.

The witnesses indicated that if the wolf pack was completely eliminated, and if there is industrial development creating a fragmented landscape, then the situation may arise whereby this area becomes entirely devoid of wolves, in turn reducing the connectivity of the wolf populations that occupy ranges to the north and to the south. They maintained that from a genetic standpoint it is important to have some continuity. However they indicated that if wolves are displaced from the

area it is likely that they would come back following construction, and would likely make use of the linear surface feature created by the trunk line.

Further to the fragmentation issue, the Big Loop Group's experts indicated that wolves would not likely be removed from places like Banff National Park or nearby associated protected areas. They postulated that there would remain a continuing flow of animals into these working landscapes. However, they stressed that the Project would add a level of uncertainty, and that the wolves might leave that area temporarily. They noted that even Petro-Canada acknowledged that there would be a prey shift during construction. Mr. Mamo and Mr. Kaminski concluded that wolves would probably shift their activities to the east where there are more wintering herds of cattle. As a consequence of this, there is potential for the wolf pack to increase its impact upon the ranching community. If that happened, they postulated that there would be pressure to go through another population control sequence, even going so far as potentially eliminating "problem wolves." Petro-Canada's proposal to construct during the winter period and avoid areas zoned as critical wildlife did not address the interveners' concern that prey would be displaced. The Big Loop Group's experts indicated that critical wildlife habitat in the area had never been fully identified or delineated by SRD, therefore the extent of prey displacement can not be understood based on existing information.

The Big Loop Group indicated that it was concerned about the proposal by Petro-Canada to conduct a pre-den or pre-pipeline construction survey, because Petro-Canada only knows where two of the dens are, and there are likely alternative dens. It postulated that if Petro-Canada disturbed all of them there could be serious effects for those wolves including the possibility of higher pup mortality or complete failure to whelp, increased risk of predation, and energetic factors associated with wolves finding and bringing food to surviving pups.

The Big Loop Group argued that a competent den survey would involve several years of study just to determine if the aforementioned wolves and their dens would be affected. It indicated that, based on telemetry data, the Willow Creek den site was occupied by the alpha female wolf in 2007 in the sense that this is where she was going to be whelping. However, an improperly conducted den survey by Petro-Canada contractors on April 11, 2007, immediately prior to whelping, led to the abandonment of that den. Petro-Canada did not contact specialists who had been tracking wolves for several years in the area to obtain either data or protocol advice.

The interveners believe the direct, indirect, and cumulative effects of the trunk line to be such that it would not expect the restricted activity periods to be effective for achieving the outcome that is desired.

The Big Loop Group also stated that development of a quad trail in the Eden Valley Reserve area for access to the facility would create a situation of access to year-round recreation and subsistence hunting for the public. This would, in turn, create the potential for longer-term impacts on this area. For instance, it maintained that if there was year-round subsistence hunting, then there could be a serious impact on the moose, elk, and deer populations in the area. Increasing access would change the dynamics of this area as a natal and home site, given that the proximity to these ungulates is critical component of wolf den viability.

8.5.3 Findings of the Board

The Board accepts Petro-Canada's argument that given the large size of grizzly bear home ranges, employing a study area of 468 km^2 can be appropriate for evaluating effects on a wide-ranging species such as grizzly bear in a regional context. The Board is also of the view that a study area this extensive is also appropriate for understanding cumulative effects of the Project. Therefore, including other land uses at this scale would have been helpful in understanding cumulative effects of the Project at a watershed scale. The Board also believes that an analysis focused on the Project alone should have been completed at a smaller scale so that the extent of Project effects could be better understood. The Board also understands that the use of a large local study area dilutes Project effects to an extent where potentially significant effects may appear small. Had this been the only analysis of changes to habitat and mortality risk, this would be a concern. However, the Board notes that the application contains analyses of habitat change based on direct habitat alteration and indirect reductions in habitat effectiveness from sensory disturbance that consider zones of influence adjacent to Project activities or facilities. The Board is satisfied that sufficient information has been provided to understand potential effects of the Project at several scales.

The Board is concerned that Petro-Canada may have understated the risk to the regional grizzly bear population in its EA. Should the Project lead to increased risk of mortality, as predicted by both Petro-Canada and interveners, that increase could result in a diminished capacity of the landscape to sustain a viable grizzly bear population. The need to reduce grizzly bear mortality at a provincial scale has led to a curtailment of hunting in Alberta. Although Petro-Canada indicated that it believed that the Project will not affect the long-term viability of the regional population, the Board is of the view that Petro-Canada has not done a complete job of evaluating this. The Board is concerned about issues raised by interveners that Petro-Canada has looked at spring habitat quality only and has not connected changes in habitat quality to mortality risk. The Board recommends that Petro-Canada satisfy the need of SRD to have the mortality risk fully evaluated prior to issuing the PLA for the trunk line. Furthermore, the Board expects that this information will be used by Petro-Canada in meeting its commitment to provide compensatory habitat improvements to offset increases to grizzly bear mortality resulting from this Project. The Board directs Petro-Canada to assist in any monitoring programs that may be initiated in the area by SRD and will assist in managing factors that contribute to grizzly bear mortality in the Project area.

There was significant discussion about the utility of models for evaluating changes in habitat availability, quality, and mortality risk. Given Petro-Canada's analysis that indicated effects on mortality will be large in magnitude, long term, and regional in extent, it appears that there is potential for the Project to contribute significantly to grizzly bear mortality. The Board is not convinced that the use of newer RSF models would have led to a substantially different conclusion. However, it is also clear that the potential effects on grizzly bear mortality would be primarily through increased public access and use of the area. In fact, the intervener experts indicated that the Project has the ability to improve habitat quality in terms of providing a food source. As discussed in more detail below when considering access management, the Board is of the view that managing public access to the area is key to minimizing mortality risk.

The Board is of the view that Petro-Canada's opinion that wolves occupy territory based on prey availability and are not habitat selective is simplistic. The intervener experts indicated that a

combination of factors influences the selection of den and rendezvous sites, including food, security, and water in close proximity. It appears that the selection of den sites is as much about security as prey availability, and both must be satisfied to provide high quality habitat.

Petro-Canada has indicated that it would be willing to assist with wolf research in the area. The Board directs Petro-Canada to work with SRD to determine activity of wolves in the vicinity of the known dens and rendezvous sites. If activity is confirmed, then Petro-Canada must abide by any restricted activity period and setback that SRD believes is appropriate. Petro-Canada should monitor the movements of wolves during the construction and early parts of the operational phase of the Project.

Based on the history of population control of the Willow Creek wolf pack and the persistence of wolves in light of those pressures, the Board is not convinced that the Project presents a serious risk to the long-term survival of the Willow Creek pack. However, the Board is concerned that during the construction phase of the Project, the displacement of wolves and their prey can bring wolves into greater conflict with the ranching community. The Board is of the view that a mechanism to deal with this issue already exists through SRD's Wildlife Predator Compensation Program. Petro-Canada should work with SRD and the local ranching community to monitor changes in wolf-livestock interactions.

During cross examination, interveners drew comparisons between the proposed Project and the TMX Anchor Loop Project. The Board notes that the two projects occur in landscapes with significantly different management regimes, so direct comparison of the two projects regarding effects on wildlife is not valid.

8.6 Access Management and Landscape Fragmentation

8.6.1 Views of the Applicant

Petro-Canada described the landscape of the area as diverse and relatively undisturbed with few roads and little industrial activity. It stated that a very high percentage of vegetation communities in the area are natural, configured in large, well-connected patches and that biological diversity of the area is also very high in comparison to other areas in the region. Petro-Canada indicated that, by almost all measures of landscape pattern, this is an area of high ecological integrity.

Petro-Canada indicated that it developed a detailed access management plan in its EPP. According to Petro-Canada, the plan would be a "living" document subject to change based on input from stakeholders, regulatory agencies, and the results of Petro-Canada's monitoring program. Petro-Canada submitted that its proposed development would not create any new access points. It indicated that access would be gained from existing roads with locked gates, with keys held by Petro-Canada, grazing lessees, or landowners. In addition to locking gated access, Petro-Canada said it intended to man the gates during construction, drilling and completion phases.

Petro-Canada stated that it designed its proposed gathering system to eliminate circular access by avoiding construction over Cutthroat and Flat Creeks, allowing it to avoid creating access through both Cutthroat and Flat Creek valleys.

It was submitted that approximately 5.2 km of new all-terrain vehicle (ATV) trail would remain along the trunk line ROW to allow access to emergency shutdown valves. Access from the south would be from the Willow Creek equestrian trails, where there is currently a locked gate.

Petro-Canada noted that under the current land-use legislation, motorized access is not permitted north of Highway 532, but is permitted on designated trails south of Highway 532. According to Petro-Canada, SRD indicated that there was very little noncompliance in this area.

Petro-Canada stated that one of its major mitigation measures to address access management would include the use of rollback. It explained that rollback, consisting of roots, stumps and other timber slash, would be applied in variable heights within the ROW depending on the purpose it would serve. For areas where rollback would be meant largely for cattle management it would be lower, and it would be higher in areas for the management of motorized vehicles.

With the exception of grassland areas, rollback was proposed to be used on the entire extent of the ROW from Highway 532 north to approximately 5.1 km south of Highway 541. Petro-Canada stated that the rollback would be of sufficient quantity that it would make it extremely difficult, if not impossible, for someone to ride an ATV down the ROW. With respect to the 5.1 km section south of Highway 541, rollback would be placed on the majority of the ROW while maintaining a narrow quad trail for access by Petro-Canada employees. Petro-Canada committed to continued consultation with SRD and local ranchers to ensure appropriate placing of any rollback.

Mr. Eccles, speaking on behalf of Petro-Canada, described a scenario in which monitoring of access controls could be a condition of approval. In his experience with the National Energy Board (NEB) concerning pipelines with issues similar to this, the NEB requested a monitoring plan that included objectives and appropriate performance measures. If performance objectives are not met, Petro-Canada would have to come up with corrective actions. He added that the NEB has required that the proponent go out and check for any breaches of access control measures during construction and operational phases of the Project. If there were breaches, they had to come up with a corrective action.

Petro-Canada indicated that the 7-7, 8-7, and 3-19 pad sites, the trunk line north of Highway 541, and the central facility would all be located in a critical wildlife zone. Furthermore, it noted that this area is a critical ungulate range with a restricted activity period of January 1 to April 30. The 6-15 pad site and 10-25 well site would be outside of critical wildlife zones; however, Petro-Canada indicated that it would self-impose a restricted activity period from January 1 to April 30 for this area as well.

Petro-Canada stated that it would employ year-round drilling at the 3-19 pad, but that construction activities would abide by all restricted activity periods. It indicated that the decision to allow year-round drilling was discussed with SRD at length. Petro-Canada indicated that, based on this site being located in a lodgepole pine-dominated stand, SRD deemed year-round drilling to be appropriate. Additionally, it would allow Petro-Canada to drill its wells back to back, thereby reducing the amount of rig moves and disturbance in the area. Petro-Canada submitted that each rig move would require over 100 truckloads, and that if it was required to pull out prior to the restricted activity period, that would cause drilling to be extended over two years with added set-up time. Petro-Canada argued that by concentrating the activity and drilling continuously, followed by continuous completions, there would be less risk of mortality to

grizzly bears and other animals as truck traffic would be greatly reduced. In addition, it stated that by drilling continuously over winter when grizzly bears are hibernating, the disturbance would displace bears to a smaller extent than if it occurred throughout the following spring and summer.

8.6.2 Views of the Interveners

8.6.2.1 The Big Loop Group

The Big Loop Group was of the view that regardless of the rules, some members of the public do not abide by them and may access these areas with ATVs. Therefore, there would be a need for strictly enforced access management.

The Big Loop Group argued that access control was a cardinal issue of concern because it felt unauthorized access had the greatest potential for impacts on ecologically sensitive areas. It stated that one question that must be answered is whether or not the Project will lead to an increase in unauthorized access that would otherwise not have occurred in absence of the Project. The Big Loop Group summarized Petro-Canada's proposed mitigation measures in terms of signage, rollback, locked gates and monitoring, and argued that Petro-Canada's mitigation measures would fall short of preventing instances of unauthorized access.

The Big Loop Group believed that ATV users who see Petro-Canada employees using the ROW for maintenance will at some point also want to follow, thereby leading to unauthorized access. The Big Loop Group presented testimony from Cam Gardner of the MD of Ranchlands to support its view that no amount of mitigation can prevent all forms of unauthorized access. Mr. Gardner then added that some form of access must be maintained for operations purposes, and that this is what induces unauthorized users to seek access. Mr. Gardner also testified that rollback, even if it is designed for controlling ATV users, has no impact on snowmobile users in the winter, when rollback is covered with enough snow.

The Big Loop Group presented evidence to support its view that no amount of signage can prevent unauthorized access. It submitted a photo from Petro-Canada's Vegetation Baseline Report showing a quad trail along a pipeline ROW that passed through a rare plant community of Foothills Rough Fescue located on the north side of Highway 532. The Big Loop Group argued that the particular pipeline ROW had been under Petro-Canada's care for at least five years, and that, despite signage and monitoring, the plant community had sustained damage.

8.6.2.2 Adderson

Adderson argued that locked gates are not 100 per cent effective. Evidence was submitted of two separate incidents where people disregarded locked gates and hunted bighorn sheep in the area last summer. One was described as taking place on a Petro-Canada site on Plateau Mountain.

In addition, Adderson explained that every year in Banff National Park there are instances where wheeled vehicles, motorcycles, four-wheel-drive vehicles, and snowmobiles obtain access to places that are off-limits. It is concerned that increased access would make this area easier to explore and could result in an increase in non-Project-related traffic.

8.6.2.3 The Pekisko Group

The Pekisko Group argued that the use of rollback would impede the movement of wildlife and cattle.

It submitted that ATV use in this headwaters region is currently causing catastrophic damage in the Indian Graves area. It argued that when recreational users see Petro-Canada using motorized vehicles to construct its pipeline, recreational users will assume that ATV use is permitted. The Pekisko Group was concerned that the rules would not be enforced.

8.6.3 Findings of the Board

The Board notes that both Petro-Canada and the interveners agreed that the landscape in which the Project would be situated is highly diverse biologically and is relatively intact ecologically. What is at issue is what effect the Project will have on that landscape and the biological diversity it supports. The habitat security issue is paramount to understanding the environmental effects of the Project on wildlife. Successful mitigation of habitat fragmentation issues and risks to wildlife will require that access be limited along the trunk line and in the gathering system for motorized vehicle use as well as for foot and equestrian use.

Petro-Canada has created an access management plan that focuses on the use of rollback on the trunk line and locked gates at access points to the gathering system and central facility to prevent public access. There will be a small increase in open trail access associated with access to ESD stations. Of particular concern is the 5 km long stretch of ROW that will be accessible to the public south of the Highwood River adjacent to the Eden Valley Reserve. In conjunction with existing trails that will intersect the trunk line, this will potentially lead to increased use by humans, causing avoidance by wildlife and increased risk of grizzly bear mortality.

The Board believes that it is important that access controls be monitored and modified if required. SRD must make it clear that motorized access is not permitted in the area and be prepared to aggressively patrol the area and prosecute transgressions. Petro-Canada should be prepared to assist in this effort. The Board notes that according to Dr. Leeson, speaking on behalf of Adderson, access control in Banff National Park was effective because there are significant enforcement and substantial penalties.

The Board believes that Petro-Canada's proposed mitigation measures against unauthorized access are reasonable. These measures include rollback, public education, signage, locked gates, monitoring, inspection, and ROW reclamation. As well, Petro-Canada has indicated that it will report infractions to SRD, which has legal authority for enforcement and financial penalties. However, the Board acknowledges that performance measurement, reporting, and communication among stakeholders will be the ultimate determinants of success for the proposed measures.

The Board recommends to SRD that Petro-Canada be required to meet its commitment to monitor increased use of the area resulting from access created by its Project, to report its findings to SRD and impacted stakeholders, and to remedy problems as they arise in consultation with SRD.

8.7 Air Emissions and Effects

8.7.1 Views of the Applicant

Petro-Canada stated that it had assessed air quality impacts and implications for human and livestock health as part of its application to the ERCB. It said that while flaring would occur during well clean up operations, the duration of flaring would not exceed 72 hours using flare management plans that would ensure compliance with AAAQO. It stated that in-line production testing would be used, and that flaring would be limited to small vapor volumes released from storage tanks. Operational emissions would be limited to sweet natural gas combustion in heaters and generators, and Petro-Canada indicated that compressors would be electrically powered. Its assessments indicated that it would comply with AAAQO near its facilities as well as at more distant sites.

Petro-Canada stated that it had evaluated flaring scenarios. It said that updated information consistent with *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* requirements would be provided to the ERCB. The assessments predicted that ground-level SO_2 concentrations would exceed related one-hour AAAQO for well cleanup and for certain central facility maintenance flaring scenarios. Petro-Canada indicated that flare management plans would be used to avoid flaring under unfavorable meteorological conditions. Petro-Canada further argued that its flare management plans, where required, would ensure that it would not exceed the requirements of the AAAQO.

Petro-Canada filed both human and livestock health risk assessments that used well-established and widely accepted protocols. The assessments addressed a number of different exposure scenarios from all stages of the Project, a range of potential chemicals of concern, receptor locations of concern with respect to area land uses and exposure pathways to assess short and long term exposure risks. It noted that a high degree of conservatism was used to avoid understating risks. This work indicated that health risks were associated with well blowout scenarios, however, there were no significant acute or chronic risks associated with well cleanup or production operations, recognizing that flaring management plans would be in place and would comply with *Directive 060*.

Petro-Canada noted that the Pekisko Group acknowledged that its evidence on livestock health impacts was generic in nature and did not involve analysis of the Project on livestock in the local area. It submitted that an understanding of its human and animal health risk assessments and related air dispersion modelling materials would be imperative for proper interpretation of its evidence. It stated the Pekisko Group's concerns, although of general interest, were of questionable relevance to Petro-Canada's Project.

Petro-Canada further stated that the results of the Western Interprovincial Scientific Studies Association (WISSA), as expressed by its Science Advisory Panel, found no association between oil and gas facility emissions and most animal health outcomes, and that the effects that were found were small and of questionable significance. It said that its livestock health risk assessment referenced the WISSA study and a considerable number of other studies, and that it considered Project-specific circumstances and emission scenarios in its planning. Petro-Canada noted that the Pekisko Group's views did not match those of the Science Advisory Panel, that the association between SO_2 exposure and calf mortality was weak. It stated that the WISSA findings could not be arbitrarily applied to specific projects.

8.7.2 Views of the Interveners

8.7.2.1 Adderson

Adderson stated that the air is pure around the Adderson Ranch and noted that there is currently no development near the ranch other than the highway. It indicated that the proposed central facility would produce a continuous flare and SO_2, nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter, as well as SO_2 emissions from maintenance and emergency flaring. It maintained that these pollutants would represent a material degradation of current ambient air quality.

8.7.2.2 The Pekisko Group

The Pekisko Group stated that it consists of livestock producers and that it was concerned regarding risks to livestock from catastrophic as well as day-to-day emissions from the proposed Project. It raised concerns arising from the WISSA study with respect to Petro-Canada's animal health risk assessment. Its concerns included

- increased calf mortality from SO_2 exposure,
- increased calf veterinary treatments from H_2S exposure,
- increased respiratory lesions from benzene and toluene exposure, and
- increased odds of muscle or myocardium lesions from SO_2 exposure.

The Pekisko Group stated that the WISSA study established a connection between exposures and negative animal health outcomes and that these outcomes are a concern with respect to the Project.

The Pekisko Group argued that oil and gas development places a significant burden on livestock producers with respect to investigation of animal health problems. It noted that the high cost involved in health investigations and the difficulty in proving causation must be taken into account by the Board. The Pekisko Group did not expect that the animal health issue alone would cause the Board to reject Petro-Canada's application, but submitted that unaddressed animal health concerns should be one of a number of reasons to deny the Project. Alternatively, the Pekisko Group stated that there should be a compensation scheme that does not put the financial burden on livestock producers, and submitted that such a protocol should be a condition of approval.

8.7.3 Findings of the Board

Petro-Canada indicated that it will put appropriate facility design and operational controls in place to comply with the requirements of *Directive 060* and to comply with the AAAQO. The Board has clear and enforceable requirements to protect air quality and prevent adverse effects from air emissions. The Board believes that this Project, properly designed and operated, will meet these requirements and is satisfied that emissions associated with Project operations, including flaring, are not a barrier to approval of the Project.

The Board notes that the human and animal health risk assessments provided by Petro-Canada generally indicate that the Project will not result in unacceptable effects with respect to emissions

from well cleanup and ongoing operations and maintenance. The Board believes that the assumptions involved in the health risk assessments are conservative and overestimate real exposures. The Board is not persuaded by the generic evidence provided by the interveners that the methodologies and conclusions arising from the health risk assessments are incorrect.

The Board does acknowledge that there could be adverse health outcomes arising from unignited and ignited uncontrolled well or pipeline releases. That said, the Board must consider not only the consequence of such an event, but also the probability that it may occur and the effectiveness of emergency response mitigation measures. The Board addresses risks associated with uncontrolled releases in Section 7.

8.8 Noise

8.8.1 Views of the Applicant

Petro-Canada submitted an NIA that established and assessed noise impacts attributable to the central facility at each of five potential sites. It also submitted an addendum to the NIA to reflect additional Project knowledge combined with the reporting requirements of the fifth edition of *Directive 038* to a 1500 m receptor point, Residence 1 (located approximately 1836 m southeast), and Residence 2 (located approximately 2328 m south-southeast) from the proposed Option 1 central facility site.

Results from the initial NIA indicated that Option 1, 1A, and 4A along with all well pad locations, would comply with the daytime and nighttime permissible sound level (PSL) of *Directive 038* at the residences and receiver locations assessed. Petro-Canada submitted that Options 2 and 3 would exceed the nighttime PSL of *Directive 038* at a reception point located 1500 m from the Option 2 facility site and at Residence 2 (located approximately 1506 m from Option 3). It stated that results from the addendum to the NIA for Option 1 indicated compliance with the Daytime and Nighttime PSL of *Directive 038*, and used potential noise-mitigating measures to reduce the noise impact of the central facility to the community. Petro-Canada admitted that the Option 1 addendum assessment did not include the noise contribution from surface facilities located at distant well sites or workcamps associated with drilling programs. Petro-Canada stated that it is committed to selecting the quietest equipment it can find, so long as it is not prohibitively expensive. It also committed to keeping Adderson informed as to what noise control measures it would be implementing.

Petro-Canada stated that there would be some noise emanating from the temporary camps during the drilling and completion phases. It indicated that for the drilling phase, it would be using the camp on the Getty road from May until December. It further stated that use of the 6-15 camp would take place between May and September. Petro-Canada noted that if noise becomes an issue during the drilling and construction phases, it would address it at that time. Petro-Canada also stated that (despite the operations it has done to date at these campsites), it has not had any stakeholder concerns regarding noise.

Petro-Canada indicated that the main sources of noise from the camps would be the camp generators. Petro-Canada submitted that it would apply noise mitigation techniques to the generators, like mufflers and silencers, if appropriate. It admitted that the noise from these generators would be continuous for the drilling and completions phases. Petro-Canada stated it

would have to monitor the actual noise levels at the 18 camp and discuss it with the landowner across the road, with whom it intends to be in constant communication.

Petro-Canada committed to redo the NIA in accordance with *Directive 038* once final equipment has been chosen and final sound levels from exact equipment is known. Petro-Canada noted that it was not planning to include the noise impact associated with the work camps in the revised NIA. It stated that the work camps would be remote from the central facility site, and that other than the one in the northeast of 18, the camps would be well away from residences.

8.8.2 Views of the Interveners

8.8.2.1 Adderson

Adderson was concerned that the noise impact would be greater at Adderson's residence from Option 1 than for Option 2, and noted the recommendations for mitigation measures to further reduce the noise impact from the initial NIA. It also pointed out that the addendum to the NIA indicated a further increase in noise impact for Option 1 from the initial NIA, and requested that Petro-Canada commit to implementing the noise mitigating recommendations outlined in the addendum.

8.8.3 Findings of the Board

The Board directs Petro-Canada to submit a revised NIA based on final equipment selection for the proposed Option 1 central facility site at three receptor locations that must meet the requirements of *Directive 038* prior to Project start-up. The revised NIA must also include the noise contribution associated with the surface facilities of well sites at well pads and work camps associated with the drilling program.

The Board also directs Petro-Canada to conduct a post-commissioning comprehensive sound monitoring survey to verify compliance with *Directive 038* within six months of Project start-up.

8.9 Cumulative Effects

8.9.1 Views of the Applicant

Petro-Canada submitted that it followed the approach commonly adopted for environmental impact assessments for oil sands projects and other large energy projects in the province. It indicated that this approach considered a base case situation, which included existing environmental conditions and existing and approved projects and activities; the application case, which included base case conditions plus the Project; and a planned development case, which included the application case plus other planned projects or activities. Between forest harvesting activity, oil and gas activity, and ranching, it was noted that there has been substantial human activity within the Project area.

Petro-Canada expressed the opinion that this approach does not require ranges of natural variability to be evaluated for assessed resources. It does not require back-casting predictions of preindustrial land conditions, nor does it involve the speculative forecasting of land-use trends that do not have a defined footprint. It maintained that the approach used by Dr. Stelfox in his review of the cumulative effects of the Project was not well suited to a project-specific

cumulative effects assessment where project contributions to cumulative effects tend to be localized, can be mitigated, and should be evaluated within the context of other known footprints and activities.

Petro-Canada stated that it is possible that it will undertake additional exploration and development projects in the Sullivan and Savanna Creek fields. However, at this time no specific plans have been developed or disclosed that would allow inclusion in a cumulative effects assessment. No future potential oil and gas exploration or development activities have been disclosed by other petroleum and natural gas rights holders within the local or regional study areas used in the EA.

Petro-Canada explained that a project-specific cumulative effects assessment must adapt to the particular project in question. The assessment should reflect the scope of the Project, the nature of the Project effects, and the effects that contribute in a measurable way to broader cumulative regional processes. Petro-Canada argued that it is critical to conduct analysis at the appropriate scale; otherwise, results are taken out their ecological context. It maintained that along the Highway 532 portion of the trunk line many of the existing disturbances are related to off-highway vehicle use. Within the trunk line and gathering system portion of the Project, many of the existing disturbances are related to other activities in the area, particularly cattle grazing.

During riparian health surveys and at rare plant survey sites Petro-Canada found that riparian crossings exhibited a particularly high degree of human disturbance. It argued that there is a high level of grazing activity on allotments and grazing leases in the Project area. It noted that range improvement has been completed in the headwaters region so there have been areas where existing vegetation has been removed and seeded to agronomic species.

Petro-Canada stated that it went to great lengths to implement best practices for this Project, which were reflected in the EA. It argued that it attempted to minimize the physical Project footprint and to reduce the potential for adverse Project effects on other land uses and the environment, while balancing construction, engineering, operational, and safety considerations.

Petro-Canada submitted that the gathering system would be within the forest management agreement (FMA) for Spray Lake Sawmills, but that the trunk line would not be located near that area. It argued that the earliest forest harvesting would occur in that area would be in 2016 based on Spray Lake Sawmills' current plans. The cumulative effects assessment included forestry access roads but not any in-block roads within the clearcuts. Petro-Canada also stated that, from a habitat perspective, once forest cut blocks developed into younger stages of vegetation, they could enhance bear habitat values. However, it admitted that roads are associated with cutting activities and so bears would be faced with the issue of potential increased mortality risk as a result.

Petro-Canada indicated that much of the area was burned between 1890 and 1930, representing over 76 000 hectares, or close to 30 per cent of the regional study area. It noted that almost all of the area east of the front ranges between Highways 532 and 541 was affected by fire disturbance during this time. It stated that fires and insect outbreaks have the potential to change the ecosystems of thousands of hectares of the Eastern Slopes. Therefore, it stated that the effects contributed by a project with a footprint of 150 hectares would not even register against the scale of natural change.

Petro-Canada included the applied-for wells as well as two future wells in its cumulative effects assessment. Additional wells have been anticipated at the 1-2 well pad site for potential future drilling. Petro-Canada maintained that it would continue to use existing roads to access the pads at 7-7 and 10-25. It indicated that although these facilities might not be built at those locations today due to environmental sensitivities, the fact that they already exist means that this is not a new footprint or zone of influence so it makes sense to use existing disturbances.

8.9.2 Views of the Interveners

8.9.2.1 The Big Loop Group

The Big Loop Group expressed concern regarding the use of existing roads and pads that are in environmentally sensitive locations, such as along Flat Creek. It noted that it is not clear if these would be acceptable locations in the absence of existing disturbances.

It also noted that the majority of the forestry access roads associated with Spray Lake Sawmills' operation are not included in the EA.

Finally, it argued that the 7-7 pad is located on steep slopes above the Highwood River in Zone 2 (Critical Wildlife). Although Petro-Canada is using existing disturbances to minimize new and cumulative disturbance, it stated that if this pad were to be build today it would not be acceptable due to its location within important ungulate winter habitat.

8.9.2.2 Adderson

Much of the testimony by Adderson concerning cumulative effects was provided by Dr. Stelfox. Dr. Stelfox based much of his information and conclusions on the SFS, which used his Alberta Landscape Cumulative Effects Simulator (ALCES) model. This study was described earlier at the start of Section 8.

In reviewing Petro-Canada's EA, Adderson concluded that the cumulative effects assessment was substantively incomplete. It argued that the EA's scope with respect to its spatial and temporal scales of analysis was narrow. Dr. Stelfox stated that Petro-Canada chose to look at one particular project from one particular sector only, rather than the effects of all past and future development. Therefore it could not come to a reasonable answer in terms of the true cumulative effects. With respect to quantifying meaningful space and time, Dr. Stelfox stated that the approach used by Petro-Canada does not inform stakeholders about the likely benefits and liabilities in a landscape that is being subjected to multiple land uses and natural disturbances.

Dr. Stelfox pointed out that the appropriate spatial scale for conducting an EA is that of a regional watershed. There will be lots of effects right at the Project development scale. At the regional study area scale the single effect of the footprint of Petro-Canada is diluted because a very small area is being disturbed on a very large landscape. He stated that at the regional scale, a 146-hectare disturbance was small compared to the area and it would likely have relatively little effect. Adderson argued that the key question in this instance would be whether or not the 146 hectares is in any way an accurate description of what would be likely to occur.

Dr. Stelfox, on behalf of Adderson, responded by creating his own cumulative effects assessment based on information provided by Petro-Canada. Due to resource constraints, he was not able to

look at the full suite of scenarios that were looked at by Petro-Canada, but selected a few key ones. Through this analysis, it became clear that best practices do make a difference. Adderson argued that it clearly demonstrated how important reclamation is and that how well reclamation occurs would be absolutely key in terms of driving the performance of indicators. Adderson suggested that it would be prudent to do a sensitivity analysis to ascertain the key pieces of uncertainty in these systems on the basis that this would enable one to direct funds and attention to those areas.

Adderson acknowledged that much of its studies were based on the SFS led by Dr. Stelfox. It stated that the Petro-Canada Project would fall wholly inside the SFS area. Adderson explained that the SFS questioned how land use affects management for natural capital, including water quality and supply, and carbon storage in soils. Adderson stated that the SFS attempted to find ways of maximizing benefits and minimizing liabilities. Adderson argued that water will become the key limiting piece of natural capital driving many of these land uses and societal integrity in the area, and that the Eastern Slopes are critically important to that because of their location in a headwaters area.

Adderson stated that it was of the opinion that there was a need to examine the issue of appropriate temporal scale when dealing with projects such as this. It pointed out that the landscape today is not the one that existed 50 or 100 years ago, that it is not fully pristine, but is relatively pristine in comparison to other geographies in the region. Dr. Stelfox explained that the landscape is dynamic due to the fact that since glacial ice sheets retreated 10 000 years ago it has been reformed by disturbances such as fire and insect outbreaks. He noted that a tremendous diversity of landforms, coupled with the fact that fires and insects have shaped these communities time and time again, have resulted in some stunning biodiversity in this landscape.

Adderson argued that this landscape will become busier with respect to overlapping land uses that include forestry, energy, agriculture, transportation, and recreation. Due to this, it stated that many of the key composite indicators that define ecological integrity would not likely perform very well in future. Dr. Stelfox stated that the indicators selected by Petro-Canada were not unreasonable, but that the reference point to help stakeholders understand whether the indicators are doing poorly or doing well was inappropriate. He argued that in order to look at cumulative effects properly it would be necessary to examine present land uses and to extrapolate into the future. He stated that the focus on a narrow time frame would only allow us to conclude that there is never a significant effect of any human activity. Adderson strongly recommended that the range of natural variability should be determined to provide guidance in this regard. With respect to the natural fire disturbance regime Dr. Stelfox indicated that the literature suggested that the bulk of fires in the region in the late 19th and early 20th centuries were not natural. It was of the opinion that most fires were caused by early land-use practices associated with the railway and certain recreational features.

Dr. Stelfox explained that many ecological processes are sensitive to edge and that there is a need to be able to track changes in edge as a result of human disturbance and to understand the zone of influence around it, as was accomplished by Petro-Canada. Dr. Stelfox described that currently in the SFS area there are about 6000 km of human-caused edge. He was of the opinion that this number will increase, even with rapid reclamation, because the expansion of land-use related disturbance is increasing faster than reclamation efforts. Further to this, he stated that the ALCES model suggested that this number will rise for the next four decades, just about tripling

before arriving at the next phase where there is more reclamation than new disturbance. He indicated that there is abundant literature to show that many ecological indicators of biodiversity start to decline at a density of anthropogenic edge of 2 to 2½ km/km^2.

With respect to the quality of water in the SFS area, Dr. Stelfox stated that there were three parameters that were used in the SFS study: sediment, nitrogen, and phosphorous. He concluded that all of these are about three times higher than they were prior to European settlement and are increasing by about 1 to 1.5 per cent per year.

8.9.3 Findings of the Board

The Board notes that Petro-Canada and the interveners agree that the Project does not constitute the only effect on the landscape. In addition to natural disturbances and use by First Nations that have been occurring for millennia, more recent human use of the area to extract resources such as fish and timber has been occurring since the 1800s. Grazing and nonmotorized recreation are likely to continue in the area. The Board agrees that a key question is whether significant cumulative effects already exist in the area prior to development of this Project. In considering this question, the Board notes that information on regional effects of existing land use was provided. The interveners provided evidence to suggest that anthropogenic linear disturbances and sediment deposition into watercourses have increased in the region during the previous several decades and will continue to increase for several more decades. This evidence was not disputed by Petro-Canada. However, the Board also notes that many of the regional effects described by Dr. Stelfox are occurring over a much broader region than the Project area. While the Board accepts that the SFS is a useful tool for understanding land-use alternatives at a broad regional scale, it is not convinced that it can extrapolate the findings of the SFS to the more narrowly focused area of Petro-Canada's Project, which appears to have experienced less development than other parts of the SFS area.

In considering the significance of existing environmental effects caused by human activity, the Board notes conflicting viewpoints. On the subject of water quality, interveners noted that sedimentation has increased several fold in the broader SFS area. However, the interveners were not able to link this to the smaller Sullivan region. The interveners indicated that a primary source of disturbance from petroleum development were linear disturbances and that a reasonable density threshold would be in the magnitude of 2 to 2½ km/km^2. The Board notes that the density of linear disturbances in the Project area is well below this threshold. The view expressed by the interveners that the area is somewhat pristine supports the conclusion that cumulative effects in the Sullivan area are not yet of large magnitude or extent. The position of the interveners that the area has seen extensive and repeated natural and manmade disturbances, yet continues to provide a high-quality functioning landscape demonstrates that the area is resilient and can recover from disturbances. The Board is also of the view that if SRD, as the manager of public lands, holds a different view it would not issue surface dispositions.

The Board does not agree with Adderson that it must consider the potential for this Project to induce other development in the area. Petro-Canada has included existing disturbances and foreseeable future developments in its assessment in accordance with accepted environmental impact assessment methods. It is not reasonable to expect Petro-Canada to develop scenarios based on nonexistent developments and include those in its analysis. The Board also notes that

while further development may occur, future projects would be subject to approval processes that would consider project and cumulative effects.

The Board does not agree with the interveners' position that the cumulative effects assessments provided by Petro-Canada were done at an improper spatial scale. The various study areas used by Petro-Canada were sufficient to inform the Board as to the likelihood and extent to which effects of the Project will interact with those of other existing or planned projects and land uses. Therefore, the Board is satisfied that Petro-Canada has provided information at a sufficient spatial scale to satisfy the requirements of *IL 93-09*.

The Board agrees with Dr. Stelfox that selecting an appropriate time scale to determine baseline conditions is critical when evaluating environmental effects, such as increased risk of grizzly bear mortality or decreased water quality. Using the current situation as a baseline does not provide a complete picture, as there are already environmental effects occurring in the region, such as sedimentation of watercourses. While the selection of an appropriate time scale relates to the concept of the range of natural variability, the Board is not convinced that it requires this information to understand the contribution of the Project to broader regional effects. The determination by Petro-Canada that the contribution of the Project to existing and foreseeable environmental effects will not be significant is based on the assumption that mitigation measures will be completely effective. While the Board hopes that this will be the case, it also is aware that it may not be. The Board is of the view that ensuring that effects are minimized is a product of good plan development and implementation, as well as monitoring and improvement of the performance of mitigation measures. It is for this reason that recommendations for monitoring have been included in sections dealing with individual environmental resources. The Board reaffirms its recommendation that SRD should include monitoring requirements in its approval to ensure that the Project's contributions to environmental effects are within the limits indicated in Petro-Canada's application.

Regarding intervener concerns about the use of existing sites in environmentally sensitive areas, the Board maintains that this is part of the site-selection process. As this process would necessarily have involved consultation with SRD, the Board is of the view that it would have involved weighing many factors, including site sensitivities in light of existing disturbances at Flat Creek and the 7-7 and 10-25 well sites.

The Board agrees with Petro-Canada that monitoring and continuous improvement are key to evaluating mitigation measures applied to the Project to minimize environmental effects. In order for monitoring to be meaningful in terms of evaluating project effects, it is important that monitoring plans be developed that include a clear statement of desired outcomes and measures of success. The Board directs Petro-Canada to work with SRD and AENV to develop acceptable monitoring plans prior to commencement of construction. In addition to the monitoring identified by Petro-Canada, the Board expects that the need for monitoring effects on aquatic ecosystems, grizzly bears, and wolves will be discussed with SRD and AENV.

9 SOCIOECONOMIC CONSIDERATIONS

As part of its mandate, the ERCB considers whether a project is in the public interest, having regard for the project's social and economic effects. The ERCB recognizes that while a project, in its broadest sense, may be beneficial to the public interest, development can at times place a

burden on more narrowly defined segments of the population, groups and individuals. Therefore, in assessing development proposals, the ERCB seeks to ensure that there is a net positive economic impact and that there are no environmental, safety, or other impacts that are unacceptable.

9.1 Land Use

On December 3, 2008, the Government of Alberta issued its Land-use Framework (LUF). The LUF outlined seven strategies for improving land-use decision-making in Alberta. The first strategy of the LUF was to create seven regional land-use plans. In November of 2009, the Government of Alberta released the terms of reference for the development of the South Saskatchewan Regional Plan, which indicated that a draft of the regional plan would be developed and sent to the provincial cabinet for final approval by spring 2010, with the goal of implementing the plan by the end of 2012. Upon implementation in 2012, the South Saskatchewan Regional Plan may impact the mandates of government agencies.

There was considerable agreement among interveners that the Board ought to defer its decision on the proposed Project until the objectives and strategies of the South Saskatchewan Regional Plan were clarified.

In *Decision 2008-029*, the Board stated:

> The Board notes that it is required to rule upon the Petro-Canada applications within the framework of current legislation and regulations until such time as the provincial government provides the Board with a revised mandate. If, prior to the Board's final decision, the provincial government implements the Policy with specific changes to the ERCB's mandate for the area of application, the Board will take all necessary steps to ensure that such changes are respected.

To date, the Board has not received any such indications that its mandate has changed. As such, the Board will proceed within the framework of current legislation and regulations.

9.1.1 Views of the Applicant

Petro-Canada argued that its Project area could not be considered a pristine wilderness area. It defined wilderness as "an enduring natural area of sufficient size to protect pristine ecosystems, which may serve physical and spiritual well-being, and an area where little or no persistent evidence of human intrusion is permitted so that ecosystems may continue to evolve." Petro-Canada further defined pristine as being "in its original condition, original, former, primitive and undeveloped." Petro-Canada submitted that pristine wilderness would not include paved highways, gravel roads, oil and gas infrastructure, and motorized vehicles, all of which currently exist in the area.

Petro-Canada stated that the Project would fall completely within Crown lands subject to grazing leases and allotments and timber dispositions managed by SRD under the Kananaskis Country Sub-Regional IRP, the Eden Valley Reserve IRP, and the Livingstone Porcupine Hills IRP.

Petro-Canada further argued that this area is a provincially designated forest land-use zone, which includes multiple use, critical wildlife, prime protection, and provincial park areas. It submitted that the intent of a critical wildlife zone (Zone 2), as specifically defined in *IL 93-09*, is to protect ranges of terrestrial or aquatic habitat that are crucial to the maintenance of specific

fish and wildlife populations. It further pointed out that in the multiple-use zone (Zone 5), mineral exploration and development is a use that is considered to be compatible with the intent of that land-use zone under normal guidelines and land-use regulations. The Project area is zoned for oil and gas activity, and it was Petro-Canada's stated intention to extract its resources in an area where it is permitted. Petro-Canada pointed out the existence of well pads and road ways, as well as an existing fuel gas pipeline that parallels Highway 532.

Petro-Canada also submitted that this area has a history of land use, which includes traditional use by First Nations, grazing, ranching and forage improvements, coal exploration, roads, forestry, seismic, oil and gas, and recreational use.

In response to the interveners' argument that development should be halted until the LUF is completed, Petro-Canada said that it has been working on this Project since it acquired the asset in 2004, well before the LUF was issued. Petro-Canada was of the opinion that the Project would be consistent with existing land-use policies and legislation including the applicable IRPs, wildlife range guidelines, and *IL 93-09*. Petro-Canada argued that no contrary evidence was submitted by the interveners regarding its compliance with applicable regulations.

Petro-Canada argued that the Government of Alberta has said that the purpose of the LUF is to manage growth, not stop it, and to sustain the province's growing economy in balance with Albertans' social and environmental goals. Petro-Canada argued that its Project was consistent with this goal. Although the intent under the LUF may be to develop the South Saskatchewan Regional Plan by 2010, Petro-Canada argued that the implementation and legislative enactments would likely take much longer. It pointed out that, in its opinion, there would be no justification to delay an approval of its applications as delaying based on hypothetical future legislation is unwarranted and unprecedented in Alberta.

9.1.2 Views of the Interveners

9.1.2.1 The Big Loop Group

The Big Loop Group disagreed with Petro-Canada's claim that the landscape included a network of roads, trails, and cut lines already in existence. It submitted that the last drilling in the headwaters region was conducted in the 1960s by Shell, and that the seismic cut lines that were cut 40 to 50 years ago have been largely revegetated. It noted that in the headwaters region today, there are no industrial activities such as oil and gas, coal, and forestry, and that natural reclamation has been occurring in these areas for over 30 years.

The Big Loop Group submitted that the headwaters region is one area within the Eastern Slopes that remains largely unfragmented and uneroded and that it includes significant parts of the mountainous landscape. The Big Loop Group stated that the area has a high ecological integrity with an equally high percentage of natural vegetation configured in large blocks that are well connected.

The Big Loop Group also stated that, due to technological advancements, encroachment by humans in the area is easier now than it was in the past. It took the position that the proposed Project would conceivably multiply that effect.

It argued that the Government of Alberta's *A Policy for Resource Management of the Eastern Slopes* is a guide to resource managers and others regarding the Eastern Slopes. The Big Loop Group highlighted that the policy states: "The highest priority in the overall management of the Eastern Slopes is placed on watershed management." The Big Loop Group stated that the headwaters region under the aforementioned Policy is in the Kananaskis Sub-region which has the Kananaskis Sub-regional IRP. The Big Loop Group stated that the headwaters fall within the Highwood Resource Management area and that this area "will be oriented towards the preservation and conservation of the valuable aesthetic and wildlife resource." The Big Loop Group added that the IRP indicated that "watershed protection will be of paramount concern along with the preservation of environmentally sensitive terrain, representative areas of natural landscape, and critical wildlife ranges. Resource and recreational development will be allowed where they do not conflict with the major intent."

The Big Loop Group submitted that the evidence presented in this case showed that the proposed trunk line does not meet the priority of the Kananaskis IRP of maintaining water quality; maintaining or enhancing landscape and aesthetic values; and maintaining or enhancing the abundance, diversity, distribution, and recreational use of the fish and wildlife resource.

With respect to the LUF, the Big Loop Group submitted that it would amount to a significant change in how land-use decisions would be made in Alberta. Furthermore, the Big Loop Group argued that it would not be in the public interest for the Board to preempt the work of the provincial government and the regional advisory council for the South Saskatchewan regional land-use plan. Moreover, the Big Loop Group submitted that it would not be in the public interest for the Board to ignore foreseeable legislation.

9.1.2.2 Adderson

Adderson submitted that there was no disagreement as to the environmental significance of the area north of the Highwood River. Adderson noted that Petro-Canada agreed that the vast majority of the area is natural vegetation and relatively undisturbed, the landscapes are highly connected, and the area has rich concentrations of landscape and vegetation diversity. It also noted that Petro-Canada agreed that the area is one of great biological richness and outstanding ecological biodiversity.

Adderson also discussed the role and state of land-use planning in the region, explaining that the Eastern Slopes are a very special landscape in terms of capacity to produce natural capital. It argued that there has been some significant erosion of that natural capital to the detriment of Albertans. It expressed the opinion that decisions are being made in an unbalanced way. Adderson argued that there is an absolute paucity of conversation about the liabilities that come with particular land uses, contrary to the popular view that there has been adequate discussion in the province on the subject. Given this, Adderson stated that rather than continuing to try and solve the symptoms of the effects of multiple land uses, there needs to be a closer analysis of how many linear features are proposed, how many people use them, and for what reason. It stated that off-highway vehicle activity was the fastest-growing land use in the Eastern Slopes.

Adderson stated that there is a critically important role for regional planning and that it should be discussed immediately. According to Adderson, regional planning should guide decisions being made within regions at an operational and tactical level. Adderson held the view that land-use decision-making in Alberta has been too permissive in terms of both the location and

compatibility of development with other forms of land use, and that this is what has set the stage for the necessary LUF. Adderson then argued that it would make sense to let the LUF unfold and then have guidance provided at the regional scale before what little flexibility is left is exhausted. It proposed that, until a land-use plan is complete, a moratorium on new development should apply across all sectors on the landscape in terms of future growth.

Adderson noted that, currently, there is no moratorium on energy or other development at the cabinet level, department level, or at the ERCB with respect to the Eastern Slopes. It argued that a different vision is needed for the Southern Foothills region and that this would require a significant conversation with all stakeholders as it needs to have broad societal acceptance. Furthermore, it would need to be implemented by a committed Government of Alberta. It suggested that the southern Eastern Slopes could serve as a test for the concept of prior land-use zoning and that such a test could be considered for application elsewhere in Alberta.

Adderson recommended that the ERCB should

- recognize the legitimacy of the SFS project as a balanced, community-driven contribution to regional planning, and
- actively discourage the piecemeal and ad hoc decision-making concerning resource use decisions.

Adderson interpreted the LUF to mean that what worked before would not work in the future. It noted that, historically, watersheds and recreational activities were deemed to be priority uses of the Eastern Slopes and that these priorities should be reconfirmed sooner rather than later. It argued that a new land-use plan for southern Alberta would not mean an end to oil and gas, timber, or country residential development, but that it would mean paying closer attention to where they are sited and how they are implemented.

Adderson explained that the Kananaskis IRP is a sub-regional plan and that the actual regional land-use plan for the area can be found in the Government of Alberta's 1984 Eastern Slopes Policy. The Eastern Slopes Policy divides the Eastern Slopes into eight different land-use zones in three broad areas:

1) protection
2) resource management
3) development

The policy states that protection applies to Zone 1 "prime protection" and Zone 2 "critical wildlife" areas. Adderson argued, therefore, that the management intent for critical wildlife zones in which the Project is proposed would be protection.

Adderson argued that the intent of the critical wildlife zone is to protect ranges, territories, or aquatic habitat that are crucial to the maintenance of a specific species. In the multiple use zone, oil and gas activity is assumed to be compatible, whereas in the critical wildlife zone, regulators must be convinced that the development would be consistent with the intent of the critical wildlife zone.

Adderson stated that the majority of the Project north of the Highwood River would fall within the critical wildlife zone, and therefore must be assessed as such under the Kananaskis IRP. In

addition, Adderson pointed out that the area north of the Highwood River falls within Resource Management Area (RMA) 5 in the Kananaskis IRP, which is the most ecologically diverse area in Kananaskis Country. It submitted that RMA 5 is oriented to the preservation and conservation of valuable, esthetic, and wildlife resources. It maintained that watershed protection is of paramount concern along with the preservation of environmentally sensitive terrain, representative areas of natural landscape, and critical wildlife ranges. Adderson argued that first order priorities are the maintenance of water quality and the maintenance and enhancement of landscape and aesthetic values, and that, therefore, oil and gas would be a third order priority.

Adderson argued that when the South Saskatchewan regional plan is created under the LUF, this area of the province would be declared off-limits to oil and gas development. It suggested that an approval by the Board of Petro-Canada's development could preclude the regional planning process from considering the possibility that oil and gas is unacceptable in this area. Given all these considerations, Adderson argued that the Board should not make a decision until the plan is finalized.

9.1.2.3 The Pekisko Group

The Pekisko Group argued that the Project was based upon the Kananaskis IRP that was implemented over twenty years ago, and that the definition of multiple use has changed over the years. It stated that in the past, ATVs were not abundant and Calgary did not have a population of over a million people, and that pressures on the natural areas in today's economy are quite different.

The Pekisko Group argued that the Project was not consistent with the principles in the LUF. Specifically, it argued that the Project was a "one-off" proposal, inconsistent with several core principles enshrined in the LUF. It highlighted Strategy No. 3 of the LUF, which makes a distinction between the existing regulatory process which views projects on a case-by-case basis and then examines the ability to mitigate the effects thereof, and the upcoming LUF which considers the cumulative effects of development with respect to the carrying capacity of the environment to withstand development. The Pekisko Group also maintained that the Project did not adequately address regional planning, nor did it address cumulative effects, which are two key principles enshrined in the LUF. It stated that the Board must examine the Project within the most current legislation if it is to uphold the public interest.

The Pekisko Group submitted that the original vision of Kananaskis Country did not intend that the principle of multiple use should supersede the use and enjoyment of the public's outdoors, or that short-term economic plays should supersede the foundations of ecological goods and services. In fact, the 1984 Eastern Slopes Policy states that "the management of renewable resources is the long-term priority of the Eastern Slopes."

9.1.3 Findings of the Board

The interveners have expressed the desire and expectation that existing energy dispositions be curtailed until the outcome of the LUF process is complete. There is currently no land-use planning direction that would indicate that the Project area is excluded from petroleum development. The view that there should be a moratorium on development in the area is not a decision for the Board, but rather one that rests with the Government of Alberta. The Board notes that the Government of Alberta has not imposed such a moratorium.

There is some evidence that land-use decisions are being deferred on a regional basis. In particular, the interveners raised deferral of approving the C5 Forest Management Plan as an example of a land-use decision that is awaiting completion of the LUF process. Approval of the applied-for Project alone will not significantly impede the ability of land-use planning through the LUF to provide meaningful direction for further development.

The Board notes that the Kananaskis Country Sub-regional IRP creates provisions for resource development insofar as it upholds the major intent of a particular zone.

The Board finds that the Project upholds the intent of existing land-use policies. The Board has concluded that the applicant's mitigation processes are adequate to balance priorities of current land-use zones within the Project area.

9.2 Grazing

9.2.1 Views of the Applicant

Petro-Canada stated that one of its key mitigation measures to control unauthorized access was the use of timber slash or rollback on the ROW but recognized its potential to interfere with cattle movement if the rollback were too high. Petro-Canada believed that cattle could cross rollback up to 2 feet high.

Petro-Canada stated that it had taken steps to mitigate impacts on cattle management resulting from unauthorized access, predator behavior, deterioration of grasslands quality, spread of weeds, and invasive species.

Petro-Canada agreed to ongoing consultation with landowners, Stoney Nakoda Nation, and SRD to assess the success of its proposed cattle management plan (see Figure 5). Petro-Canada's commitments pertaining to cattle operations are set out in Appendix 1.

9.2.2 Views of the Interveners

9.2.2.1 The Big Loop Group

The Big Loop Group expanded on how impacts to wolves could translate into impacts on ranching activity, as described in Section 8.

9.2.2.2 Adderson

Adderson expressed concerns about the effectiveness of the proposed rollback mitigation measure and its impact on cattle movement.

9.2.2.3 The Pekisko Group

The Pekisko Group expressed concern about the impact of the Project of the accessibility of the Timber Creek grazing allotment, which is in the vicinity of the Project. The Pekisko Group indicated that although its members were not directly on the proposed trunk line ROW, their livelihoods would be impacted.

The Pekisko Group also expressed concerns regarding the effectiveness on the proposed Petro-Canada rollback in preventing unauthorized access, as well as how the design of the rollback could impact cattle operations. It did not object to rollback specifically, but had concerns with how well it would perform as it biodegrades over time.

9.2.2.4 The Stoney Nakoda Nation

The Stoney Nakoda Nation echoed the Pekisko Group's concerns regarding invasive plant species. In addition, the Stoney Nakoda Nation supported the Big Loop Group's views on wolf displacement and increased conflict with ranching activity.

9.2.3 Findings of the Board

The Board believes that Petro-Canada's cattle management plan provides reasonable mitigation measures. Where interveners have found that the plan fell short, Petro-Canada has agreed to consult with landowners and SRD to find a solution. The Board sees monitoring and consultation as the key to minimizing or eliminating these risks. Accordingly, the Board finds Petro-Canada's approach to be acceptable.

The Board understands the importance of access management to the maintenance of grazing lease quality. The Board has summarized its views under its responses to access management, reclamation and grasslands, and soils and sedimentation in Section 8.

With respect to predators, the Board notes the potential for the displacement of wolves and the potential for conflict with ranching. The Board is aware that SRD administers the Wildlife Damage Compensation Program for cattle losses stemming from predation, including losses due to wolves. The Board also understands that SRD is responsible for making forensic determinations. Thus, the Board believes that Petro-Canada's work with SRD on monitoring wolf behaviour will identify instances where wolf movements conflict with ranching operations.

9.3 Future Development Plans

9.3.1 Views of the Applicant

Petro-Canada stated that it had no current plans for further development in the headwaters region and that it would be difficult to speculate on what other companies might do. From Petro-Canada's viewpoint, approval of the trunk line would not necessarily attract additional drilling activity. Based upon the available well and seismic information in the area, Petro-Canada stated that it did not believe that other drillable sour gas prospects exist in the region. Petro-Canada also believed that there was little prospect for success in shallower formations and did not see opportunities for coalbed methane or shale gas in the area.

With respect to the Big Loop Group's request that Petro-Canada commit to never develop any resource in the region beyond the current proposal and to never connect any other wells to the proposed trunk line, Petro-Canada stated that while it believed future resource development to be unlikely, it did not believe commitment to absolutes was a reasonable approach. In Petro-Canada's view, excluding itself from future development could result in duplication of facilities. Petro-Canada maintained that subjecting itself to such a constraint would not prevent other companies from developing any interests they have or may acquire. Petro-Canada stated that any

future development in this area would be subject to the same regulatory process and that it would have to consult with area residents prior to the application for any future plays. Petro-Canada added that implementing these two requests as conditions of approval for the Project would cause it to reevaluate the Project's economic viability.

Petro-Canada responded to argument from the Pekisko Group regarding the economic viability of the Project in light of weak commodity prices. Petro-Canada stated that the amalgamation with Suncor, and a decline in the price of natural gas had no impact on its intent to develop the Project. It stated that mergers cannot always be anticipated, and that any intervener concerns would be addressed by conditions attached to a Project approval. It also stated that the priorities of Suncor and Petro-Canada with respect to safety and environment were "very much aligned." With respect to trends in natural gas prices, Petro-Canada acknowledged that the price decline was a short-term phenomenon, but added that the long-term nature of its business outlook predisposed it to adopting a long-term perspective of energy prices, which in its view was optimistic.

9.3.2 Views of the Interveners

9.3.2.1 The Big Loop Group

The Big Loop Group held the view that the only explanation for Petro-Canada (despite having workable alternative routes) choosing to route its pipeline through an environmentally sensitive area was that it had future development plans in mind. The Big Loop Group offered testimony from Mr. Bartlett, who maintained that Petro-Canada must have a specific ulterior motive to use the Project to open up the Highwood Region to even more natural gas drilling. The Big Loop Group also added that even though Petro-Canada had not acquired additional lands that could indicate future plans, the development of the Project would grant Petro-Canada a form of market power. According to Mr. Bartlett, Petro-Canada would control the entire area between the Sullivan and Savanna Fields and any other parties seeking to develop the area would not be able to do so without insurmountable expenses.

The Big Loop Group also requested that Petro-Canada agree to the following two conditions:

1) No further mineral acquisitions and no drilling in the headwaters region.
2) No additional wells other than those within the currently delineated Sullivan Pool north of the Highwood River will be connected to this pipeline.

9.3.2.2 Adderson

Adderson held the position that the only way to prevent the destruction of the historical integrity, the economic viability, and the social importance of the ranching region was to deny incremental oil and gas development in this region. It argued that the approval of a few wells and one pipeline would likely lead to massive pressure to proceed with future development.

9.3.2.3 The Stoney Nakoda Nation

The Stoney Nakoda Nation argued that the location of the proposed trunk line in close proximity to Eden Valley Reserve and to lands owned by 218336 Development Ltd. would preclude future residential development and restrict other human activities on portions of both the Reserve and

the Stoney Nakoda Nation fee simple lands. Specifically, the Stoney Nakoda Nation was concerned that a proposed campground and future residential housing on the west end of Eden Valley Reserve would be compromised by the close proximity of the proposed trunk line.

Furthermore, the Stoney Nakoda Nation argued that the Board had no jurisdiction to affect or preclude development on reserve lands. It submitted that the Board had no jurisdiction to approve Petro-Canada's proposed trunk line in such proximity to Eden Valley Reserve. This will be further discussed in Section 10.

9.3.2.4 The Pekisko Group

The Pekisko Group stated that although Petro-Canada may not have any current plans to expand development in this area, the presence of a trunk line connected to a processing plant would induce further development.

Additionally, the Pekisko Group argued that the economic context of the Project indicated that it was no longer economically viable, the merger with Suncor hinted that the newly formed entity would be divesting itself of natural gas assets, and there was a potential to develop the Project without producing any gas.

9.3.3 Findings of the Board

The Board notes Petro-Canada's position that although it has no plans for future development, it cannot accept the conditions proposed by the Big Loop Group.

The Board further notes that any proposal for future resource development would need to receive approval to proceed and would be assessed by the ERCB on the basis of the evidence submitted and subject to the regulations and environmental conditions at the time. The Board believes that it would not be appropriate to impose the conditions proposed by the Big Loop Group because they would in effect create a moratorium on development by Petro-Canada. The Board has previously stated that it does not believe that the imposition of a moratorium is a decision for the Board. In addition, the Board does not believe that it can constrain its discretion with respect to future applications.

The Board does not believe that the amalgamation of Petro-Canada and Suncor materially affects the Project. Mergers in the oil and gas industry are regular occurrences and merged entities are subject to the same regulatory oversight to ensure that all regulatory requirements, statutes, and legislation are met. The Board notes that the regulatory framework has accounted for such events. *Directive 006: Licensee Liability Rating (LLR) Program and Licence Transfer Process* governs the licence transfer process, sets out licence transfer application requirements, and outlines the variety of licence transfer decisions that may be made by the Board. The Board expects that all the commitments made by Petro-Canada throughout the course of the hearing will be honoured by Suncor.

9.4 Leger Report

In September 2008, the Pekisko Group hired Hoggan and Associates to conduct an omnibus survey pertaining to Petro-Canada's proposed Project. The firm retained Leger Marketing to conduct a telephone survey of 900 respondents from September 18, to 29, 2008. The survey was

omnibus in nature in that it included eight questions pertaining to the proposed Project as part of a larger questionnaire. Leger explained that omnibus surveys are used to share costs among multiple clients. The results of the survey are contained in a document entitled "Hoggan and Associates Omni Results, September 2008," hereinafter referred to as the Leger Report.

9.4.1 Views of the Applicant

Petro-Canada held the view that the Board should give no weight to the Leger Report because the credibility of the evidence was questionable. Specifically, Petro-Canada submitted that the there had been no information provided to indicate what material the poll respondents had seen, read, or heard, or indeed how familiar they were with the Project. In addition, Petro-Canada stated that the questions posed were biased and leading.

9.4.2 Views of the Intervener

9.4.2.1 The Pekisko Group

The Pekisko Group explained that the Leger survey surveyed 900 Albertans; 300 from Edmonton, 300 from Calgary, and 300 from other regions in the province. According to Leger, the results are considered accurate 19 times out of 20, within 3.3 per cent.

It submitted that the information provided by the poll was a snapshot in time of Albertans' opinions about this particular issue. It understood that the poll was not exhaustive and acknowledged that eight questions on an omnibus survey was the most inexpensive way to obtain the pulse of what Albertans think about further oil and gas development in the province and how to move forward.

The Pekisko Group submitted that the results of the Leger Report should be noted by the Board as part of all the evidence filed in this proceeding. In its view, the most important point to note was that three quarters of all respondents agreed that there should be a moratorium on the approval of development in the Eastern Slopes, pending the implementation of the LUF. According to the Pekisko Group, it would be appropriate for the Board to take into account this strong public support for the new land-use process.

9.4.3 Findings of the Board

The Board agrees with Petro-Canada that the Leger survey included leading questions and that there is no indication that the respondents were in a position to make an informed response. The Board is of the view that the results of the Leger survey do not necessarily represent the views of directly and adversely affected parties. Accordingly, the Board has given the survey results relatively little weight.

10 QUESTION OF CONSTITUTIONAL LAW

The Stoney Nakoda Nation served a Notice of Question of Constitutional Law dated June 20, 2008, (the First NQCL) to the Board and other parties, including the Attorney General of Alberta (the AG) and the Attorney General of Canada. The notice included the following two questions:

1) Whether elements of, inter alia, the *Energy Resources Conservation Act*, R.S.A. 2000, c. E-10, the *Oil and Gas Conservation Act*, R.S.A. 2000, c. O-6, and the *Pipeline Act*, R.S.A. 2000 c. P-15, granting the Board the jurisdiction and powers to make a decision pertaining to multiwell gas battery, pipeline and directional gas well applications within the traditional lands of the Stoney Nakoda Nation, are applicable in light of the aboriginal and treaty rights held by the Stoney Nakoda Nation and s. 35 of the *Constitution Act*, 1982?

2) Whether the location of the Eden Valley Reserve within the EPZ of the proposed Project mandates the application of federal law?

In argument, the Stoney Nakoda Nation specified certain sections of the legislation referred to in the first question. The impugned legislation are Sections 16, 20, and 21 of the *Energy Resources Conservation Act*, Sections 17, 18(1) and 94 of the *Oil and Gas Conservation Act* and Sections 3.1, 8, and 9(1) of the *Pipeline Act* (the impugned legislation)

Section 35(1) of the *Constitution Act*, 1982 provides:

> 35. (1) The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.

The AG and the Attorney General of Canada were given notice of this application. The AG participated in the hearing and submitted argument. The Attorney General of Canada advised that it would not be making any submissions in response to this application.

Appended to the Stoney Nakoda Nation's First NQCL were Details of Argument set out in further detail below. The Stoney Nakoda Nation stated in paragraph 23:

> As these are purely questions of law, no witnesses in relation to the constitutional questions so stated will be called to give evidence before the Board.

In addition, the Board in a letter to interested parties dated September 24, 2008 dealing with the First NQCL stated:

> As a result of discussions between Board counsel and counsel for the Stoney Nakoda Nation, the Board confirms that, at this time, it is the intention of counsel for the Stoney Nakoda Nation not to present argument, evidence or witnesses regarding his [NQCL] at the hearing of these applications....
>
> By way of this letter, the Board directs that any further developments or changes in the foregoing on the part of counsel for the Stoney Nakoda Nation, Alberta Justice, or Petro-Canada be immediately communicated to Board counsel.

Lastly, by letter dated November 6, 2008, the Stoney Nakoda Nation stated:

> ...we can advise that the Stoney Nakoda Nations agree that any examination of the adequacy of consultation by the Government of Alberta with the Stoney Nakoda Nations, is not a matter properly before the Board. Such issues will arise at such time as the applicant, Petro-Canada, applies to the Alberta Crown for lands required for the project....

10.1 Views of the Stoney Nakoda Nation

In its argument appended to its June 20, 2008 NQCL, the Stoney Nakoda Nation submitted that they are an Indian band under the *Indian Act*, R.S.C. 1985 c.I-5 and are "Aboriginal Peoples" within the meaning of the *Constitution Act, 1982*. The Stoney Nakoda Nation argued that they

hold aboriginal and treaty rights in the area of the proposed Project including rights to hunt, fish, harvest plants, cultivate medicinal herbs and roots, engage in ceremonial practices, use sacred sites and access clean water. They submitted that the Project was proposed to be located on the Stoney Nakoda Nation's traditional lands.

The Stoney Nakoda Nation submitted that by virtue of Section 35(1) of the *Constitution Act, 1982*, existing aboriginal and treaty rights that have not been extinguished by explicit federal legislative action were entrenched in the Constitution of Canada. Further they pointed out that pursuant to Section 91(24) of the *Constitution Act,* 1867, Parliament was granted legislative authority over "Indians, and Lands reserved to the Indians" and cited *Delgamuukw* v. *British Columbia* [1997] 3 S.C.R. 1010 as authority for the proposition that "lands reserved for the Indians" included more than just reserve lands.

At more than one point in its various submissions, the Stoney Nakoda Nation made reference to an outstanding legal proceeding in Stoney v. Alberta and Canada in the Alberta Court of Queen's Bench, Action Number 0301-19586. In that action, aboriginal and treaty rights allegedly held by the Stoney Nakoda Nation in respect of their traditional lands are being pursued. It offered little detail about the rights asserted in the litigation and the status of that lawsuit. It made reference to a Certificate of Lis Pendens that the Stoney Nakoda Nation has registered against lands through which a portion of the trunk line would pass.

The Stoney Nakoda Nation contended that any decision by the Board on Petro-Canada's applications could directly affect, impact and unjustifiably infringe the exercise of asserted aboriginal rights and established treaty rights on the Stoney Nakoda Nation's traditional lands and that the jurisdictional and power conferring provisions of, inter alia, the *Energy Resources Conservation Act* (*ERCA*), the *OGCA*, and the *Pipeline Act* could invade exclusive federal authority over Indians and lands reserved for Indians. The Stoney Nakoda Nation further submitted that these provincial energy statutes invaded exclusive federal authority by virtue of the proximity of reserve lands to the location of the proposed Project, the inclusion of the reserve lands in the EPZ and that Her Majesty the Queen in Right of Canada, as legal title holder to the reserve lands, had not sought intervener status with respect to the proposed Project.

The Stoney Nakoda Nation pointed out the various public protection measures that could be required on the reserve lands pursuant to the emergency response planning of the applicant including evacuation and road blocks in the event of a sour gas release and argued that the legal title holder of the reserve lands had not consented to such protection measures.

The Stoney Nakoda Nation argued that the energy statutes purported to grant the Board the discretion to authorize the emergency planning measures and as such the referenced statutes had the effect of altering existing federal rules regarding the use, occupation and control of the reserve lands, all of which are within the exclusive competence of Parliament. The Stoney Nakoda Nation cited authority for the proposition that provincial laws must not affect an integral part of federal jurisdiction over Indians and lands reserved for Indians and that if a provincial law of general application was inconsistent with a federal law in its application to Indians, then the doctrine of paramountcy applied and the provincial legislation was inapplicable to those lands.

The Stoney Nakoda Nation cited the following authorities:

- *Derrickson v. Derrickson* [1986] 1 S.C.R. 285

- *Four B Manufacturing v. United Garment Workers* [1980] 1 S.C.R. 1031
- *Surrey v. Peace Arch Enterprises Ltd.* (1970) 74 W.W.R. 380 (B.C.C.A.)
- *Re Stoney Plain Indian Reserve No. 135* (1983) 35 A.R. 412 (C.A.)

The Stoney Nakoda Nation said that the ERCB lacks jurisdiction to issue a decision on the proposed Project because such a decision would affect, impact or infringe upon Stoney Nakoda Nation reserve land and its occupants, without as a minimum, the written approval of Her Majesty the Queen in Right of Canada.

The Stoney Nakoda Nation served another NQCL (the Second NQCL) dated April 24, 2009, on the Board and other parties. In the Second NQCL the Stoney Nakoda Nation raised two further questions of constitutional law. The first related to the adequacy of consultation, accommodation and compensation by the Crown in relation to the applications. The second question related to the propriety of the taking up of provincial Crown lands.

The May 29, 2009, final argument of the Stoney Nakoda Nation dealt extensively with the questions set out in the Second NQCL and the new issues of

1) whether the honour of the Crown is advised by Canada's covenants pursuant to International Law;
2) whether the Project lands being provincial Crown lands had been taken up in a manner consistent with the honour of the Crown;
3) whether the Project lands had been properly taken up as they were not required in good faith; and
4) did the Board have the jurisdiction and obligation to address the adequacy of consultation, accommodation and compensation, if any, conducted and offered by Alberta or Canada.

The Stoney Nakoda Nation made additional arguments in its June 26, 2009, submission. It reiterated and commented at length that the proposed Project results in a bad faith taking up of Crown land contrary to Treaty 7 and that the Project will negatively impact the aboriginal and treaty rights and title of the Stoney Nakoda Nation. Further it argued that the health risks to the residents of the Eden Valley Reserve had not been approved by either the Stoney Nakoda Nation or Canada. The Stoney Nakoda Nation also argued that the Cultural Assessment Overview prepared and submitted by Petro-Canada acknowledged the continued exercise of Stoney Nakoda Nation's *in rem* rights and other rights throughout their traditional lands. The Stoney Nakoda Nation further argued that present Alberta guidelines and directives are not of general application as they do not contemplate sour gas facilities adjacent to Indian reserves nor do they contemplate adjacent non-reserve homes being part of the same community as an on reserve collection of home. The argument also expressed that the Stoney Nakoda Nation may be subject to confusion as to whether the taking up of land has yet to occur based upon the testimony at the hearing and complained about the lack of testimony of Alberta on this point. The argument culminates by stating that consultation with the Stoney Nakoda Nation has been put directly at issue in view of the conflicting evidence before the Board about the dispositions of land to Petro-Canada and whether the taking up of land is to occur before or after the Board renders a decision.

The Stoney Nakoda Nation argued that consultation with the Stoney Nakoda Nation had to occur under the LUF before the Board could approve the Project and that an approval of the Project before the Treaty Land Entitlement was determined would have a negative impact upon the claims of the Stoney Nakoda Nation. The argument went on to make bad faith "taking up" arguments and asserted that the taking up of lands is related to the public interest mandate of the Board. The Stoney Nakoda Nation also asserted that the Board lacks jurisdiction to approve the applications without first determining consultation issues.

The argument of the Stoney Nakoda Nation invited the Board to consider the totality of the evidence in conjunction with that of Keith Lefthand who testified about the Stoney Nakoda Nation's exercise of treaty and aboriginal rights to fish, trap, hunt, and harvest herbs and timber, among other activities, in the area contemplated to be included by the Project. It argued that the Board is obliged to consider the issue of consultation by the Crown with the Stoney Nakoda Nation whether or not the issue of consultation is before the Board by way of an NQCL and that to approve the Project in the absence of any examination of consultation would be unlawful.

10.2 Views of the Attorney General of Alberta

The AG responded to the First NQCL with submissions dated October 14, 2008, and October 30, 2008.

The AG expressly stated that its brief was "...premised on the assumption that the Stoney Nakoda Nation will not present argument, evidence or witnesses in support of the [First] NQCL...." and that it would not call evidence or participate in the hearings unless it was requested to do so by the Board. This position was based upon the Board's correspondence to interested parties dated September 24, 2008.

The AG submitted that the Board was fully constitutionally competent to deal with the applications of Petro-Canada and that its decision would be valid and binding upon residents of the Eden Valley Reserve. The AG further argued that federal approval or permission was not required in order for the Board to exercise full jurisdiction over the applications and that it was necessary to include the reserve in emergency response planning in order to better ensure protection of the health and safety of reserve residents and to ensure coherent area wide contingency planning, both of which fell within the public safety jurisdiction of the Board.

The AG pointed out that none of the proposed wells, pipelines or related facilities would be located on the reserve lands and added that Petro-Canada had filed a Cultural Assessment Overview summarizing the results of consultation undertaken with First Nations communities to deal with potential impacts of the Project. The AG described the inclusion of reserve lands within the EPZ of the Sullivan Area ERP prepared by Petro-Canada.

The AG argued that the issue regarding the Crown's duty to consult was not properly before the Board and that it would not respond to this issue. The AG reiterated the issues as being the following:

1) What is the jurisdiction of the ERCB vis-à-vis the Stoney Nakoda Nation?

2) Are there any federal approvals, under either the *Canadian Environmental Assessment Act*, S.C. 1992, c.37 (*CEAA*) or otherwise, which are required before the ERCB can make a

decision, either with respect to the inclusion of the Stoney Nakoda Nation in the ERP, or on the application generally?

After describing the mandate of the Board, the AG pointed out that provincial jurisdiction over oil and gas production is to be found in the provisions of the *Constitution Act, 1867* dealing with property and civil rights, local works and undertakings, matters of a local or private nature, and natural resources.

The AG contended that the law is well established that provincial laws of general application apply to Indians and lands reserved for the Indians so long as the law is in relation to a matter coming within a provincial head of power citing:

- *Four B Manufacturing* v. *United Garment Workers* [1980] 1 S.C.R. 1031;
- *R.* v. *Francis* [1988] 1 S.C.R. 1025;
- *R.* v. *Dick* [1985] 2 S.C.R. 309; and
- Hogg, *Constitutional Law of Canada*, 5th ed. Supp.,(Toronto: Thompson Carswell, 2006)

It said that provincial legislation, validly enacted under a provincial head of power is not necessarily invalid because it affects another subject within federal jurisdiction. It has been held that Indian reserves are not "enclaves" from which provincial laws are excluded.

- *Four B Manufacturing v. United Garment Workers*, supra, para. 40
- *R.* v. *Francis*, supra, para 4.

The AG stated that in order to determine that a provincial enactment is not a law of general application, it must be shown that the intent, purpose or policy of the legislation was to impair the status of capacities of a particular group. It must be shown that the legislature intended an impact on Indians or singled out Indians for special treatment. The AG argued that the legislation impugned by the First NQCL is of general application and in no way does it single out Indians or have a particular impact upon Indians in intent, purpose or policy. The AG said that the Stoney Nakoda Nation has not pointed out any way in which this is the case.

The AG set out Hogg's five exceptions to the general rule that provincial laws apply to Indians and lands reserved for the Indians:

1) The law cannot single out Indians or Indian reserves for special treatment;

2) The law cannot affect an integral part of primary jurisdiction over Indians and lands reserved for Indians (also referred to as laws that impair the "status or capacity" of Indians or that affect "Indianness");

3) Federal law is paramount: If a provincial law is inconsistent with a federal law the former is rendered inoperative to the extent of the conflict;

4) The provisions of the natural resources transfer agreements between the federal government and certain provinces (including Alberta), which protect Indian rights to take game and fish for food: and

5) Section 35 of the *Constitution Act, 1982* which protects aboriginal and treaty rights.

With respect to the first exception the AG points out that none of the provisions impugned by the Stoney Nakoda Nation can be construed as singling out Indians or lands reserved for the Indians for special treatment. This exception does not apply here.

With reference to the fourth exception, the natural resources transfer agreements, the AG stated that it does not apply here as the First NQCL does not allege that the legislation in questions negatively affects the Stoney Nakoda Nation's right to harvest game and fish for food.

To deal with the fifth exception the AG pointed out that while the First NQCL refers several times to Section 35 of the *Constitution Act, 1982*, the First NQCL does not specify which aboriginal or treaty rights will be affected by the Project, the extent to which such rights will be affected, the provisions in the legislation which affect Section 35, or how the legislation allegedly offends Section 35. The AG noted the stance taken by the Stoney Nakoda Nation that no evidence or witnesses would be called and said that it relied upon the Stoney Nakoda Nation to establish any infringement of aboriginal or treaty rights.

To deal with the second exception, the AG submitted that there is no evidence that the impugned legislation extinguishes any aboriginal or treaty rights. Nor, it is argued, does the legislation affect Indian status or possession of Indian lands.

The AG contended that the Stoney Nakoda Nation has failed to establish that any of the traditional uses of the land relevant to the applications, either on or off the reserve, lie at the core of "Indianness". To establish this would require evidence and argument which the Stoney Nakoda Nation stated it was not going to present at the hearings.

With respect to the third exception of paramountcy, the AG argued it had no application here as the Stoney Nakoda Nation did not establish any inconsistency between provincial legislation and federal legislation. Hence the doctrine had no application.

The AG argued that "the environment" is the subject of shared jurisdiction between the provincial governments and the federal government and that each level of government may legislate in the area including legislation concerning EA. The AG cited *Friends of the Oldman River Society* v. *Canada (Min. of Transport)* [1992] 1 S.C.R. 3 as authority. The mere fact that the EA undertaken by Petro-Canada touches on possible effects upon an area of federal jurisdiction does not mean that *CEAA* will automatically apply and confer a decision making role upon the federal responsible authority. *CEAA* will apply to a project where triggered pursuant to the criteria set out in Section 5. The First NQCL refers to Section 37 of *CEAA* however Section 37 is a decision making provision that applies only after an EA under *CEAA* has taken place. The AG submitted that Section 37 is of no relevance to this proceeding and that there is no conflict or inconsistency between Section 37 and anything in the impugned provincial legislation.

With respect to the ERP having an effect on reserve residents, the AG argued that provincial legislation aimed primarily at ensuring public safety, but which incidentally affects the conduct of individuals upon Indian reserve lands is constitutionally valid. The AG further argued that provincial laws of general application will apply of their own force if they do not affect the Indianness of any Indian or the Indian use of land. It pointed out that the main objective of the ERP is public safety which does not affect the use of Indian lands, but rather the conduct of

individuals upon those lands in the limited context of emergency situations. To not include the reserve in emergency planning for the Project could expose reserve residents to danger to health and safety and could also result in the creation of gaps which hamper area-wide contingency planning.

The AG filed a supplementary brief dated October 30, 2008. It argued that the Crown's duty to consult was not properly before the ERCB by virtue of its being absent from the First NQCL. Both questions raised in the First NQCL related to the federal-provincial division of powers. Further, the brief dealt with aboriginal and treaty rights and argued that aboriginal rights did not survive the signing of Treaty No. 7. The AG indicated that there was not a case in the province that has found a Treaty First Nation is entitled to the benefit of an existing aboriginal right and as such the Stoney Nakoda Nation had no basis upon which to claim aboriginal rights in the area affected by the proposed Project. The only potential issue was whether any treaty rights may be affected.

The AG turned to the issues of onus, burden of proof, and evidence in relation to treaty rights and submitted that the evidential foundation for a serious constitutional claim in these proceedings was lacking as there was little or no evidence respecting:

a) The precise nature and extent of each right claimed:

b) The significance of each claimed or asserted right for the Stoney Nakoda Nation's culture or way of life;

c) The connection, if any, between a present-day practice and pre-contact practices or culture of the Stoney Nakoda Nation (in the case of aboriginal rights);

d) In the case of asserted treaty rights, the basis for the asserted right in Treaty No. 7; and

e) How the impugned legislation infringes upon the rights asserted.

By a brief dated June 25, 2009, the AG responded to the final argument of the Stoney Nakoda Nation. It pointed out that there was only one NQCL properly before the ERCB. Consultation was not one of the issues raised. The Stoney Nakoda Nation did not lead evidence with respect to the two questions properly before the Board as they stated in the First NQCL that the issues were legal issues that did not require the Stoney Nakoda Nation to call evidence.

The AG pointed out that the Stoney Nakoda Nation attempted to change its position with the filing of the Second NQCL to raise issues of consultation, accommodation, aboriginal and treaty rights, infringement, and allegations of bad faith in the taking up of land under Treaty No. 7. The AG pointed out that the Board had already determined that it had no jurisdiction to consider these new constitutional issues and arguments raised in the Second NQCL. The AG asserted that despite the ruling of the Board on the Second NQCL, the final submissions of the Stoney Nakoda Nation focused almost entirely on the issues raised therein. The AG submitted that most of the final submissions should be struck out and disregarded.

The AG then turned to the two questions that were properly before the Board and argued that:

a) The impugned sections of the *ERCA*, the *OGCA* and the *Pipeline Act* are provincial laws of general application that apply to Stoney Nakoda Nation of their own force and effect and the ERCB is fully constitutionally competent to deal with Petro-Canada's applications; and

b) The location of the Eden Valley Reserve within the EPZ of the proposed Project does not mandate the application of federal law.

The AG said that Alberta has relied upon the First NQCL and the representations of the Stoney Nakoda Nation throughout the proceedings and had proceeded on the understanding that consultation is not an issue before the Board. The AG stated that it would not respond to the improper portions of the final submissions of the Stoney Nakoda Nation and would confine itself to the two questions that were properly before the Board. The AG pointed out that parties are entitled to know the case they are to meet before the hearing commences and that the AG was entitled to know the constitutional case that it was to meet. The Stoney Nakoda Nation could not attempt to change the nature of the issues that it had put before the Board, it could not suggest it had somehow discharged its onus of proof nor could it suggest that consultation issues were automatically engaged in light of the evidence before the Board. The AG stated that the evidence of Keith Lefthand with respect to activities and uses on what the Stoney Nakoda Nation claims are its traditional lands was not presented for and was not relevant nor necessary for a determination on the two constitutional questions contained in the First NQCL. For that reason and as stated by the AG during the hearing, Alberta had no reason to cross-examine Mr. Lefthand. The AG argued that the Stoney Nakoda Nation could not now attempt to use the evidence of Mr. Lefthand for an entirely different purpose given the representations of counsel for the Stoney Nakoda Nation and the invalid Second NQCL. Finally, the AG said that the Board should not consider constitutional arguments that are not necessary to determine the two constitutional questions properly before it.

The AG then turned to the two questions properly before the Board and reiterated and expanded upon the arguments that it had placed before the Board in its pre-hearing submissions of October 2008 described above. On the first question, the position of the AG was that the impugned legislation is applicable to the Stoney Nakoda Nation and that the Board has the jurisdiction and power to determine the applications. The legislation is validly enacted under provincial jurisdiction over oil and gas development and production and it applies to the Stoney Nakoda Nation. The onus was on the Stoney Nakoda Nation to establish that the legislation falls within one of the five exceptions to the general rule that provincial laws apply to Indians and lands reserved for Indians and the onus was not discharged. The AG argued that the legislation did not impair the status or capacity of Indians.

In dealing with the first four exceptions to the general rule, the AG said they did not apply here as the impugned legislation

a) did not refer to Indians or Indian reserves and did not single out Indians or Indian reserves for special treatment;

b) did not regulate the status of capacity of the Stoney Nakoda Nation as Indians or the possession or use of its reserve lands;

c) are not inconsistent with any federal law in relation to the same subject matter; and

d) did not regulate treaty rights with respect to the harvesting of game and fish for food.

The AG pointed out that the Stoney Nakoda Nation appeared to rely upon the fifth exception to the general rule about the applicability of provincial legislation, that the legislation does not apply in light of Section 35 of the *Constitution Act, 1982*. The First NQCL does not allege that the impugned legislation unjustifiably infringes Stoney Nakoda Nation treaty rights and therefore Alberta must justify the legislation in accordance with the *Sparrow* test. The First NQCL does not refer to the test and does not specify which aboriginal or treaty rights could be affected by the applications of Petro-Canada or the extent to which they might be affected. The First NQCL does not outline how the impugned legislation offends Section 35. Finally, the Board's decision on the Second NQCL confirms that arguments relating to consultation, taking up of land, infringement, and justification are not properly before the Board.

Because the issue of consultation is not before the Board, it need not consider the arguments of the Stoney Nakoda Nation relating to the honour of the Crown.

In connection with the proximity of the proposed Project to the Eden Valley Reserve, the AG contends that as no activity is being proposed on reserve lands, the AG does not see how mere proximity affects the applicability of the impugned legislation.

In conclusion on the first question, the AG asserts that the ERCB has the legislative mandate to consider Petro-Canada's applications and decide whether to grant the necessary approvals. The impugned legislation are valid laws of provincial application and they apply to the Stoney Nakoda Nation of their own force and effect.

On the second question in the First NQCL, the AG's position was that the Board is fully constitutionally competent to deal with the applications and that the location of the reserve lands does not mandate the application of federal law. No activity is being proposed on reserve lands. Alberta did not accept that by not responding to the First NQCL Canada "does not dispute the assertions contained" in the First NQCL. Alberta assumed that Canada would have engaged in the process if it was concerned that the impugned legislation encroached upon federal jurisdiction or if any federal laws were paramount. According to the AG, Canada's lack of participation did not demonstrate support for the Stoney Nakoda Nation position but instead demonstrates that Canada does not contest the validity of the provincial legislation. Canada does get involved where it opposes provincial laws on the basis that they encroach on federal jurisdiction over lands reserved for Indians.

The AG asserted that the Board has jurisdiction to approve an EPZ regardless of who owns the lands within the zone. Consent of landowners is not required and Canada's ownership of lands within the zone does not affect the Board's jurisdiction. No federal rules regarding the use, occupation and control of reserve lands are altered. The Stoney Nakoda Nation's interest in their reserve lands is not affected. The legislation does not regulate land use on reserve lands. The Stoney Nakoda Nation has not discharged its onus to establish that set-back requirements for sour gas pipelines impair the use of reserve lands or that the relevant requirements treat Indians or residents of an Indian reserve different from other Alberta residents.

Finally, the AG argued that there are no federal approvals or permissions required in order for the Board to exercise full jurisdiction over the applications. The possible need for federal approvals or permits from federal decision makers in the future does not affect the Board's jurisdiction to determine the applications before it.

10.3 Views of the Applicant

In its pre-hearing submission of November 7, 2008, Petro-Canada responded to the First NQCL and the brief of the Stoney Nakoda Nation filed therewith. It supported all of the arguments in the AG's October 14 and October 30, 2008, submissions. Petro-Canada echoed the AG's argument that the issue of consultation was not properly before the Board because it was not raised in the First NQCL. Further, Petro-Canada argued that it was not sufficient for the Stoney Nakoda Nation to raise, without evidence, the spectre of possible jurisdictional flaws in the ERCB's enabling statutes. Such important constitutional questions are only properly to be tested against a factual context and none was offered in this case.

Petro-Canada pointed out the Board's broad mandate which would include in the proper case the consideration of consultation and the adequacy of consultation. Much of this initial brief of Petro-Canada deals with the duty to consult and the necessary evidentiary foundation on such an issue.

Petro-Canada's position on the first question was that (i) the Stoney Nakoda Nation having led no evidence, the Board should decline to decide the constitutional question in a factual vacuum, (ii) the Board has sufficient mandate in its legislation that it can consider issues relating to the Crown's obligation to consult and therefore, the legislation is not constitutionally invalid, and (iii) there is not a constitutional expectation that the Board shall supervise the provincial Crown with respect to its duty to consult.

In relation to the second question posed in the First NQCL, Petro-Canada agreed with the AG. Specifically, Petro-Canada agreed that the Board is fully constitutionally competent to issue a decision on the Project and that its decision would be valid and binding on the reserve residents. Petro-Canada also asserted that no federal approval was required in order for the Board to issue its decision. It too distinguished the cases relied upon by the Stoney Nakoda Nation and stated that nothing about the cases assisted the Stoney Nakoda Nation in establishing that the Board encroaches on exclusive federal jurisdiction because safety procedures set out in the ERP would include the Eden Valley Reserve.

In its June 25, 2009 reply to the argument of the Stoney Nakoda Nation, Petro-Canada reviewed the history of the First and Second NQCL and specifically noted the representation of the Stoney Nakoda Nation made in its pre-hearing brief that the two questions in the First NQCL are questions of law and that no witnesses would be called. Petro-Canada referred to the Board's September 24, 2008 letter confirming that the Stoney Nakoda Nation had indicated that it would not be presenting argument, evidence or witnesses in relation to the First NQCL. Petro-Canada noted the AG's reliance on this position.

Petro-Canada relied upon the absence of the issue of the duty to consult from the materials related to the First NQCL and the November 6, 2008 letter from counsel for the Stoney Nakoda Nation to the effect that the adequacy of consultation was not an issue properly before the Board.

Petro-Canada then turns to the issue of the late delivery of the Second NQCL in late April, 2009 in which the Stoney Nakoda Nation purports to resile from its earlier positions that both the AG and Petro-Canada relied upon. Petro-Canada relies as well upon the May 8, 2009 decision of the Board that the Second NQCL was not filed in a timely way and as such the Board was without jurisdiction to address it because, in part, it would be prejudicial to the AG and to Petro-Canada.

Petro-Canada pointed out that Stoney Nakoda Nation's May 29, 2009 argument goes far beyond the constitutional questions in the First NQCL and deals with matters that Petro-Canada reasonably expected it was not required to address in the hearing. Petro-Canada argued that the final argument of the Stoney Nakoda Nation was a blatant attempt to re-introduce issues which the Board ruled were not before it and which would take unfair advantage of the AG and Petro-Canada given the previously made representations of the Stoney Nakoda Nation. Petro-Canada said that this would be a grave breach of procedural fairness. Petro-Canada concluded by stating that the Board should disregard the whole of Stoney Nakoda Nation's May 29, 2009 argument.

10.4 Findings of the Board

The Board carefully considered the issues of constitutional law raised by the Stoney Nakoda Nation, as well as the evidence presented at the hearing. The Board is a designated decision-maker pursuant to the provisions of the *Administrative Procedures and Jurisdiction Act* and as such has jurisdiction to determine all questions of constitutional law raised before it.

The First NQCL raised two questions of constitutional law that are properly before the Board. The Board ruled on May 8, 2009, that the Second NQCL had not validly placed additional constitutional issues before the Board because it was served out of time pursuant to the *Administrative Procedures and Jurisdiction Act*, R.S.A. 2000, c. A-3. The Stoney Nakoda Nation sought and was denied a review and variance proceeding on this ruling. The decisions of the Board were not appealed.

The Board is without jurisdiction to consider issues of consultation, infringement of aboriginal and treaty rights, and the improper taking up of Crown lands. The Board will therefore confine itself to the two questions first raised.

The Board agrees with the AG and Petro-Canada that much of the final argument of the Stoney Nakoda Nation deals specifically with the constitutional issues raised in the Second NQCL, and the Board will not address that submission. The Board holds that the Stoney Nakoda Nation cannot now resile from its position, to the detriment of Petro-Canada and the AG who relied upon that position, that consultation was not an issue properly before the Board. This would not be fair to Petro-Canada and the AG who approached the hearing and framed their cases based upon representations from counsel for the Stoney Nakoda Nation. Many of the submissions made by the Stoney Nakoda Nation were based on the position adopted by its counsel that evidence would not be called and that the issue of consultation was not an issue before the Board in the hearing. The Stoney Nakoda Nation wishes the Board to consider the issue of consultation despite having stated that it was not an issue for the hearing. The Board is not declining to consider the issues of the taking up of Crown lands and the adequacy of consultation because it lacks jurisdiction to consider constitutional issues properly placed before it. Rather, it is taking the position that the issues have not been properly placed before the Board because of the lack of an NQCL raising the issues for the hearing. The Board finds that the Stoney Nakoda Nation attempted to raise issues in its final argument that were the subject of limited evidence, that were not the subject of an NQCL, and, in the case of consultation, was not to be an issue for the hearing.

The first constitutional issue is:

> Whether elements of, inter alia, the *ERCA*, R.S.A. 2000, c. E-10, the *OGCA*, R.S.A. 2000, c. O-6, and the *Pipeline Act*, R.S.A. 2000 c. P-15, granting the Board the jurisdiction and powers to make a decision pertaining to multiwell gas battery, pipeline and directional gas well applications within the traditional lands of the Stoney Nakoda Nation, are applicable in light of the aboriginal and treaty rights held by the Stoney Nakoda Nation and s. 35 of the *Constitution Act,* 1982?

Some of the cases relied upon by the parties are briefly summarized here. In *Derrickson v. Derrickson,* the Supreme Court of Canada (SCC) determined that provincial legislation dealing with the division of family assets, including real property on a reserve, was not applicable to lands reserved for Indians and that rights of ownership or possession of lands on an Indian reserve were within exclusive federal jurisdiction. The Board does not agree that the Derrickson decision applies to the legislation impugned here, which does not affect rights of ownership or possession of reserve lands.

The Board is of the view that the SCC decision *Four B Manufacturing v. United Garment Workers* is more analogous to the present situation. In that case, four band members were the owners of a company that did manufacturing on reserve lands. The issue was the applicability of provincial labour laws to the activities of the company. The SCC held that the business could not be characterized as a federal business, that it was an ordinary industrial activity clearly under provincial legislative authority, and that the statute applied of its own force. The power to regulate labour relations did not form an integral part of primary federal jurisdiction over Indians and lands reserved for the Indians. The purpose of the legislation was not related to "Indianness." The Board here considers that the impugned legislation is validly enacted provincial legislation that does not affect nor relate to Indianness.

In *R.* v. *Francis*, the SCC dealt with a conviction for a provincially legislated traffic offence that occurred on a reserve. The court held that in the absence of conflicting federal legislation, provincial motor vehicle laws of general application applied of their own force.

R. v. Dick was an SCC decision dealing with the conviction of a non-treaty Indian for the killing of a deer out of season contrary to provincial wildlife legislation. The killing of the deer occurred outside of a reserve, but in the traditional hunting grounds of a band. The SCC stated that to determine whether a provincial enactment is not a law of general application, it must be shown that the intent, purpose, or policy of the legislation was to impair the status or capacities of a particular group. If provincial legislation of general application can apply to Indians without touching their Indianness, then the legislation applies to them of its own force. Here the Board is of the view that the impugned energy legislation is of general application and does not affect members of the Stoney Nakoda Nation in their capacity as Indians.

In *Surrey* v. *Peace Arch Enterprises Ltd.*, the British Columbia Court of Appeal had to consider whether municipal bylaws applied to the construction of an amusement park within the boundaries of a reserve that was in the municipality. Because the municipal legislation purported to regulate the use of lands reserved for the Indians, it was held to be an unwarranted invasion of the exclusive jurisdiction of Parliament to legislate with respect to lands reserved for the Indians. Here, with the very limited possibility of emergency planning requiring sheltering in place or evacuation in the event of a release of gas, the impugned legislation does not purport to regulate the use of lands reserved for the Indians.

The Board is of the view that it is constitutionally competent to make a decision on Petro-Canada's Project. All Project activities are proposed to take place on provincial lands outside of the Eden Valley Reserve. The Board does not agree with the assertion of the Stoney Nakoda Nation that present Alberta guidelines and directives are not of general application as they do not contemplate sour gas facilities adjacent to Indian reserves or nonreserve homes that are part of the same community as the on reserve homes. The legislation and directives are of general application and apply in the same manner to sour gas facilities adjacent to Indian reserves as to those adjacent to non-Indian lands.

The provincial legislation is valid and provides the Board with the mandate it seeks to fulfill on the applications. The laws are of general application and do not impair the status of Indians or affect the Indianness of the reserve residents. The legislation is validly passed legislation that provides clear provincial jurisdiction over oil and gas exploration, development, processing, and transportation. As the legislation is of general application to lands within Alberta, the Stoney Nakoda Nation must show that an exception applies to the general rule that provincial laws apply to Indians and lands reserved for Indians. The Board does not accept the proposition that any of the five exceptions applies in this case and accepts the AG's position on this issue. The impugned sections of the *ERCA*, the *OGCA*, and the *Pipeline Act* are provincial laws of general application that apply to the Stoney Nakoda Nation of their own force and effect.

The Board finds that the legislation does not single out Indians or Indian reserves for special treatment. It has not been shown that the legislation has any such effect either expressly or implied. Further, it has not been shown that the intent, purpose, or policy of the legislation was to impair the capacities of a particular group; it applies to all Albertans.

The Board finds that the provincial legislation does not impair federal jurisdiction over Indians and lands reserved for Indians. Further, the legislation does not impair the status or capacity of Indians or affect Indianness. The status or capacity of the Stoney Nakoda Nation is not regulated by the legislation and possession and use of reserve lands is not regulated by the legislation.

While federal law is paramount, the Stoney Nakoda Nation has not shown that the impugned provincial laws are inconsistent in any respect with a federal law dealing with the same subject matter such that the former should be rendered inoperative to the extent of the conflict.

The provincial legislation does not affect Indian treaty rights to take game and fish for food. That leaves Section 35 of the *Constitution Act*, 1982, which protects aboriginal and treaty rights. The First NQCL does not allege that the provincial legislation unjustifiably infringes on the treaty rights of the Stoney Nakoda Nation nor does the First NQCL specify the aboriginal or treaty rights that the Stoney Nakoda Nation says could be affected by the applications of Petro-Canada. Issues of consultation, taking up land, infringement, and justification are not properly before the Board here.

While the First NQCL refers several times to Section 35 of the *Constitution Act*, 1982, the NQCL does not specify which aboriginal or treaty rights will be affected by the Project, the extent to which such rights will be affected, the provisions in the legislation which affect Section 35, or how the legislation allegedly infringes on Section 35. There was very limited evidence presented which was provided by Mr. Lefthand to establish an infringement of aboriginal or treaty rights. This constitutional question regarding rights cannot be determined in an evidentiary

vacuum. The Stoney Nakoda Nation has not met the onus placed upon it to establish an infringement of aboriginal or treaty rights.

The Board agrees with the AG with respect to the issues of onus, burden of proof, and evidence in relation to treaty rights. It agrees with the AG that the evidentiary foundation for a serious constitutional claim in these proceedings was lacking as there was very little or no evidence respecting

- the precise nature and extent of each right claimed,
- the significance of each claimed or asserted right to the Stoney Nakoda Nation's culture or way of life,
- in the case of aboriginal rights, the connection, if any, between a present-day practice and precontact practices or the culture of the Stoney Nakoda Nation,
- in the case of asserted treaty rights, the basis for the asserted right in Treaty No. 7, and
- how the impugned legislation infringes upon the rights asserted.

The provincial legislation, being of general applicability, is applicable here of its own force and effect.

The second constitutional issue is:

> Whether the location of the Eden Valley Reserve within the EPZ of the proposed Project mandates the application of federal law?

The Board does not accept that the inclusion of reserve lands in the EPZ mandates the application of federal law. Emergency response preparedness and planning pursuant to the legislation, regulations, and directives applies in any case where there is an occupied residence within the EPZ. The requirements for emergency response preparedness and planning is aimed at ensuring public safety, and here only incidentally, in the remote case of a release of gas, affects the activities or conduct of individuals on reserve lands. In the event of such a release, public safety may require sheltering in place in homes or buildings or evacuation. It does not affect the normal and usual use and occupation of reserve lands otherwise. Land use generally is not affected by the ERP.

The Board has jurisdiction to approve an EPZ regardless of who owns the lands within the zone. Consent of landowners is not required and Canada's ownership of reserve lands within the zone does not affect or remove the Board's jurisdiction. No federal rules regarding the use, occupation, and control of reserve lands are altered and the Stoney Nakoda Nation's interest in its reserve lands is not affected. The legislation as it relates to emergency planning does not purport to regulate land use on reserve lands.

The Board does not accept that by exercising its jurisdiction with respect to the safety measures of a proposed project that is not upon reserve lands, it will have encroached upon exclusive federal jurisdiction.

Dated in Calgary, Alberta, on June 8, 2010.

ENERGY RESOURCES CONSERVATION BOARD

J. D. Dilay, P.Eng.
Presiding Member

B. McManus, Q.C.
Board Member

APPENDIX 1 SUMMARY OF CONDITIONS AND COMMITMENTS

Conditions generally are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with conditions or it is in breach of its approval and subject to enforcement action by the ERCB. Enforcement of an approval includes enforcement of the conditions attached to that licence. Sanctions imposed for the breach of such conditions may include the suspension of the approval, resulting in the shut-in of a facility. The conditions imposed on Petro-Canada's licences are summarized below.

The Board also notes that Petro-Canada has made certain commitments involving activities or operations that are not necessarily required under ERCB requirements. Those commitments are summarized below. While Petro-Canada filed these commitments in the proceeding, they do not constitute conditions to the ERCB's approval of the applications. The Board expects Petro-Canada to comply with commitments it has made. However, while the panel may have taken some or all of the commitments into account in rendering its decision, the Board may not be able to enforce them. If Petro-Canada does not comply with commitments made, affected parties may request a review of the approval. At that time ERCB will assess whether the circumstances regarding the failed commitment warrant a review of the approval.

CONDITIONS

1) The Board directs that a separate and self-contained document containing step-by-step procedures for the evacuation of the Eden Valley Reserve must be created. This document is to include evacuation measures, the number of persons involved in facilitating the evacuation of Eden Valley Reserve residents, any designated areas that emergency response personnel are to focus on during an incident, and the location of resources that would be called upon to assist in the evacuation. (Section 7.1.3)

2) The Board requires Petro-Canada to amend its ERP to include copies of the notification signs, pamphlets, or placards that Petro-Canada stated it could place along backcountry access routes, trails, and campgrounds. Further, the Board conditions the licences to address the posting of these notification signs and measures at all recognized backcountry entry and exit routes within the Project area. (Section 7.1.3)

3) The Board requires Petro-Canada to investigate every odour complaint. (Section 7.1.3)

4) The Board directs that an additional notification device be provided to the Eden Valley Reserve and incorporated into Petro-Canada's ERP. Petro-Canada must complete the installation of the additional notification method prior to the commencement of operations. (Section 7.1.3)

5) The Board requires Petro-Canada to assess each residence of the Eden Valley Reserve for its suitability for sheltering in place and to identify and upgrade at least one room in each residence to make it suitable for sheltering in place. This will occur on a one-time basis and prior to the commencement of operations. (Section 7.1.3)

6) The Board requires that a full-scale ERP exercise be completed prior to commencement of operations. This exercise is to include the commitments made by Petro-Canada to hold the

exercise on the Eden Valley Reserve and to include residents of that reserve as participants. (Section 7.1.3)

7) The Board directs Petro-Canada to provide a plan for the Board's approval for the installation and monitoring of groundwater monitoring wells at the central processing facility. (Section 8.3.3)

8) The Board directs Petro-Canada to modify its Environmental Protection Plan to reflect that it will employ construction methods that will enable it to narrow its trunk line ROW as much as possible in order to minimize disturbance to the spoon-leaf moonwort population. (Section 8.4.3)

9) The Board directs Petro-Canada to honour its commitment to reclaim the existing fuel gas pipeline along Highway 532 and to initiate reclamation immediately following abandonment of the line. (Section 8.4.3)

10) The Board directs Petro-Canada to have an environmental inspector on site at all times during construction who is qualified to identify weeds and invasive agronomic species. (Section 8.4.3)

11) The Board directs Petro-Canada to assist in any monitoring programs that may be initiated in the area by SRD to evaluate grizzly bear mortality and to assist in managing factors that contribute to grizzly bear mortality in the Project area. (Section 8.5.3)

12) The Board directs Petro-Canada to work with SRD to determine wolf activity in the vicinity of the known dens and rendezvous site. If activity is confirmed, Petro-Canada must abide by any restricted activity period and setback that SRD believes is appropriate. (Section 8.5.3)

13) The Board directs Petro-Canada to submit a revised NIA that is based on the final equipment selection for the proposed Option 1 central facility site at three receptor locations and that meets the requirements of *Directive 038* prior to Project start-up. The revised NIA must also include the noise contribution associated with the surface facilities of well sites at well pads and work camps associated with the drilling program. (Section 8.8.3)

14) The Board directs Petro-Canada to conduct a comprehensive post-commissioning sound monitoring survey to verify compliance with *Directive 038* within six months of the Project start-up. (Section 8.8.3)

15) The Board directs Petro-Canada to work with SRD and AENV to develop appropriate monitoring plans prior to the commencement of construction. These plans must include clear statements of desired outcomes and measures of success. In addition to the monitoring identified by Petro-Canada, the Board expects that the need for monitoring effects on aquatic ecosystems, grizzly bears, and wolves will be discussed by Petro-Canada with SRD and AENV. (Section 8.9.3)

COMMITMENTS

This following list of commitments for the Sullivan Field Development Project was prepared as an undertaking for the ERCB and is listed as Exhibit B-173 on the hearing record. It is based on the 2008 Environmental Protection Plan (JWA 2008) and has been updated based on mitigation commitments made by Petro-Canada up to December 8, 2008 (i.e., end of cross-examination of Petro-Canada at the ERCB hearing in High River). This list will be continually revised during the Project phases.

Petro-Canada will monitor the implementation and effectiveness of mitigations, with monitoring frequency increased from that described in the 2008 Environmental Protection Plan.

General Measures – Construction and Drilling

1) Petro-Canada will not develop another surface location south of Highway 541 in order to develop the Sullivan geological structures, including redevelopment of the existing Shell lease at 01-29-016-04W5M.

2) The Environmental Protection Plan will be a controlled document. Revisions, if required, will be sent to the controlled copyholders with instructions on replacement and destruction of previous versions or pages.

3) All necessary licences and approvals will be obtained before construction commences. Petro-Canada, its contractors and subcontractors will comply with all conditions, specified permits, approvals, licences, certificates, and Project-specific management plans. Any inconsistencies between permit conditions and contract documents will be resolved before construction begins at the Project kick-off meeting.

4) Copies of the appropriate approvals and permits will be retained on site during all activities.

5) A Project schedule has been developed to take into account wildlife and fisheries-related restricted activity periods and key seasons for land users (e.g., ranchers, hunters), where practical. Petro-Canada will work with land users on an ongoing basis to resolve scheduling conflicts. A Project schedule will be issued prior to construction and will be continually updated. If the Project schedule should change, the intents of the restricted activity periods and sensitive timing windows will be followed.

6) In the gathering system area, concurrent construction of common roads and pipeline right-of-ways will be conducted to the extent practical (see 2008 Environmental Protection Plan [JWA 2008] Appendix 1: Reclamation Plan, for construction details).

7) Before the start of construction, representatives from Petro-Canada will contact applicable federal, provincial and local government personnel, as well as all potentially affected parties (e.g., residents, registered trappers, allotment holders, grazing lessees) to provide notification of commencement of construction.

8) Petro-Canada will respect local stakeholder wishes with respect to any additional surveying activity prior to Project approval.

9) Petro-Canada will ensure that consultation with stakeholders continues throughout all stages of the Project to understand issues of concern and to work with stakeholders to mitigate or manage these issues.

10) Petro-Canada will produce newsletters, brochures or information materials to promote safety awareness and to inform residents, land users, and other stakeholders of current or future activities. Information materials will include issues such as H_2S, backcountry safety and bear awareness. Information will be available at several locations including Indian Graves Campground.

11) Petro-Canada is committed to working with the Eden Valley Reserve to develop an appropriate communication system for the residents of the Eden Valley Reserve. Options include cell phone towers and boosters, sirens, horns, etc. This will be initiated in the construction and drilling phase and will be fully operational in time for the beginning of production from the Sullivan field.

12) Before construction begins, a meeting will be held with appropriate regulatory personnel, which may include the Alberta Sustainable Resource Development (ASRD) forest officer, ASRD fisheries biologist, ASRD wildlife biologist, and the ASRD range agrologist. A review of Project issues; mitigation measures and contingency plans; rules and regulations; permit conditions; and any outstanding concerns will be undertaken.

13) Kick-off meetings will be held by Petro-Canada prior to commencement of major subcomponents of the Project (e.g., road construction, pipeline construction, drilling). During the kick-off meeting, construction documentation will be distributed. Safety, contractual, and construction plans, quality control and Environmental Protection Plan Project requirements will be discussed. Given the extent of environmental sensitivities associated with the Project, a separate meeting about environmental issues may be required for each phase. Petro-Canada's "Sullivan Project Development Video", which highlights environmental sensitivities, will also be reviewed by contractors as part of the Project kick-off meetings.

14) Environmental inspectors for the Project will have experience in environmental inspection for oil and gas developments. The main responsibility of the environmental inspectors is to ensure that all environmental commitments, mitigations, and conditions of approvals are met, and that work is completed in compliance with applicable environmental regulations. Environmental inspectors will be on site during critical construction events (e.g., watercourse crossings) and will prepare daily reports for Petro-Canada.

15) Environmental inspectors will work in cooperation with the construction supervisors and other monitoring personnel, as noted in the 2008 Environmental Protection Plan (JWA 2008), Appendix J: Monitoring Plan.

16) An environmental commitment database was created during the pre-construction phase and will be continuously updated with information on commitments made during public consultation, from the environmental assessment and commitments established through the regulatory review and approval process. The database will be continually managed and updated by the Petro-Canada environmental advisor and stakeholder consultation staff.

17) All contractors and construction staff will be provided with relevant results of pre-construction surveys to identify known locations of environmentally sensitive features. Specific mitigation for these sites are indicated on alignment sheets (see Appendix F: Construction Alignment Sheets and Appendix G: Reclamation Alignment Sheets in the 2008 Environmental Protection Plan [JWA 2008]) and site plans (well pads, facility site). Sensitive sites will be identified with suitable markers (e.g., flagging) to ensure they are avoided.

18) To prevent inadvertent trespass, the pipeline and access road right-of-ways, staging areas, well sites, facility site, and extra workspace will be staked and flagged to clearly delineate all boundaries.

19) All construction activities will be restricted to the approved disposition boundaries and approved extra temporary workspace areas. Construction traffic will be restricted to the Project work sites (pads, access roads, right-of-ways, and camps), existing roads and approved shooflies. All construction traffic will adhere to safety and road closure regulations.

20) Temporary workspace will be used to deck salvaged timber and for equipment staging. Pipe will be strung as it is delivered, or will be stored on temporary workspace.

21) An Access Management Plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix L: Access Management Plan) has been developed for the Project to manage access and traffic during construction and operations.

22) Appropriate signs will be posted along public highways, access trails and road crossings; on the well sites, central facility site, access roads and gates; and near construction activities to notify the public of activity in the area.

23) All gates on access roads into the Project area will be kept locked.

24) During periods of high traffic volume, gates will be manned.

25) Traffic along field access roads will be minimized through vanpooling or bussing crew members to and from camps, as practical.

26) Any unauthorized use of the roads will be reported to the construction supervisors, security personnel and/or the local Forest Officer.

27) Recreational use of off-highway vehicles (e.g., all-terrain vehicles [ATVs]) by Project personnel and contractors will not be permitted into the Project area during Project construction and subsequent operations.

28) No construction, vehicle or ATV access over Cutthroat Creak or Flat Creek will be permitted, subject to the success of the horizontal directional drill crossing.

29) Kilometre postings will be established on all access roads in the gathering system, and in conjunction with radios, will be used to facilitate safe vehicle movement on field access roads.

30) Traffic management is required during construction of a section of the trunk line that parallels Highway 532. This includes signage to notify the public of industrial traffic and traffic controls (e.g., flag persons).

31) Traffic flow may be temporarily detoured during construction of the two road crossings along Highway 532 (36-14-04W5M and 26-14-04W5M). Temporary shooflies may be constructed to allow truck passage in particular areas.

32) Driving or parking equipment on grasslands outside of designated workspaces, designated access routes and camp boundaries is not permitted.

33) Public access to active areas during Project construction and drilling may be temporarily restricted to ensure public safety.

34) Speed limits along field access roads will be posted and enforced. Posted speeds may be lower under specific conditions, such as in areas with specific wildlife concerns and during periods of temporarily increased vehicle activity (e.g., rig moves).

35) Radar control may be used for enforcement of speed limits on access roads.

36) A radar speed limit sign for the 10-25 access road will be installed during heavy traffic periods during the construction and drilling phase.

37) Dust will be controlled through the application of water and/or the reduction of speed limits.

38) All internal combustion engines will be fitted with appropriate muffler systems and kept in good working order.

39) Water wells located close to the Project may be tested.

40) As required, gaps or breaks will be left in snow windrows, topsoil piles, grade material stockpiles and strung pipe to allow for wildlife and cattle movement, drainage and access by allotment holders.

41) The location of gaps will coincide with existing trails and wildlife movement corridors to the extent practical.

42) Petro-Canada will discuss livestock grazing patterns with the allotment holders, lease holders and Alberta Sustainable Resource Development (ASRD) range agrologists to minimize conflicts between cattle operations and the Project. A cattle management plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix K: Cattle Management Plan) has been prepared for the Project through consultation with local ranchers and the ASRD range agrologist. Updates to the Cattle Management Plan may include a compensation protocol for damage to cattle (Dec 8, 2008, of hearing). Revisions to the Cattle Management Plan will be submitted to ASRD at least 20 days prior to the planned date of entry.

43) Individual grazing allotment and lease holders will be kept appraised of specific Project activities in their area of concern.

44) Consultation with local allotment holders and lessees will take place prior to rig moves or periods of increased vehicle traffic to avoid potential cattle-related conflicts.

45) Petro-Canada will consult with local area ranchers and determine the areas or corridors that their cattle may be using to cross the right-of-way. If movement of cattle from one pasture to another is potentially restricted by rollback, Petro-Canada will discuss modifications to the planned rollback.

46) Petro-Canada will discuss the effectiveness of the access control with ranchers, both in terms of deferring access and ensuring that Petro-Canada is not impeding day-to-day ranching operations. Petro-Canada will also discuss the success of the reclamation and any areas of concern.

47) All fences cut for construction will be braced before cutting and will be equipped with temporary gates. Where access is required during operations for emergency shutdown valve (ESD) inspection and maintenance, a locked gate in fences crossed by the right-of-way will be maintained. Gates will remain closed at all times.

48) Temporary fencing may be installed around open trenches, bell holes and watercourse crossings where cattle are noted in the area.

49) Construction has been timed to avoid disturbance to wildlife during sensitive periods. Wildlife timing windows are indicated on Figure 1: Project Specific Timing Windows – Gathering System, page 11, 2008 Environmental Protection Plan (JWA 2008). If Project delays are encountered, timing windows and factors influencing timing will still be respected in the revised schedule.

50) Wildlife concerns that are identified during construction will be discussed as necessary between the environmental inspection staff, construction supervisor, wildlife specialists and where necessary the appropriate regulatory representatives.

51) Project personnel will receive bear awareness training to reduce the potential for bear/worker interactions.

52) Incidents (e.g., collisions, near-misses) involving wildlife or cattle will be reported to the field supervisor and an environmental inspector using the Petro-Canada event reporting system.

53) No pets are allowed in the Project area, in vehicles or at camps.

54) Harassment or feeding of wildlife is strictly prohibited.

55) Harassment of wildlife by helicopters will be avoided to the extent practical through measures such as avoiding key habitats during critical seasons and maintaining sufficient elevation.

56) Petro-Canada is committed to working with the Alberta Grizzly Bear Recovery Team to investigate potential measures to enhance habitat values and reduce mortality risks for bears.

57) Petro-Canada will work to ensure that the Project is consistent with grizzly bear recovery initiatives.

58) Petro-Canada will continue to be involved with the emerging technology and research surrounding grizzly bears through the Foothills Research Institute. Petro-Canada has kept abreast of emerging issues and will ensure that their operations are supportive and compliant with these initiatives.

59) Petro-Canada will work with Alberta Sustainable Resource Development to develop an appropriate setback and restricted activity period for active wolf dens.

60) Petro-Canada employees and contractors working in the Project area are prohibited from using Petro-Canada restricted access roads to gain entry for purposes of recreational fishing and hunting.

61) The three campsite locations (NE-18-18-03W5M, SW-31-17-04W5M and 02-22-14-04W5M) were selected to reduce traffic to and from work sites. The camp along the 10-25 road (SW-31-17-04W5M) will be used by construction and drilling crews working on and near the 10-25 and 01-02 wells. The camp along Highway 541 (NE-18-18-03W5M) will be used by the remainder of the drilling crews and a portion of the construction crews. The camp in the Savanna operations yard (02-22-14-04W5M) will be used by the remainder of the pipeline construction crews.

62) The camp in SW-31-17-04W5M will be temporarily fenced and a cattle guard installed for the duration of its use.

63) Camps will be located at least 100 m from water bodies.

64) Areas for activities such as trailer placement and vehicle parking at the camp will be designated.

65) Septic tanks will be installed at each camp to collect both black and grey water. Tanks will be pumped out regularly and the wastes hauled offsite to an approved disposal facility.

66) All garbage (e.g., domestic garbage, wood, plastic) will be stored in bear-proof containers and regularly transported off site to an approved landfill.

67) Petro-Canada will attempt to use noise mitigation on the gensets and mufflers at camps. Petro-Canada will monitor actual noise levels at the main camp on Highway 541 and will discuss any noise issues with the landowner across the road (the camp will be on his grazing lease).

68) Petro-Canada will spray certain patches, particularly of noxious weeds, to ensure they are dead before construction begins.

69) To aid in controlling the spread of weeds, all construction equipment must initially arrive at the Project site clean and free of soil or vegetative debris.

70) Equipment will be cleaned at designated cleaning stations prior to moving into weed-free areas from areas where weeds are present. Cleaning methods will involve either mechanical methods to remove mud from the cleats of the equipment or a high-pressure hose to blast the dirt and debris off the cleats or wheels.

71) All equipment arriving on site must be clean of excessive oil, fuel, grease, other hydrocarbons and other toxic substances.

72) Any equipment which arrives in an unsuitable condition will not be allowed into the Project area until it has been cleaned on a hard surface at an off-site location.

73) All equipment will be maintained in good working order and free of leaks (e.g., fuel, oil).

74) Secondary containment, such as spill trays, will be used during servicing of equipment in the Project area.

75) All waste materials will be managed, stored in designated bins, handled, transported and disposed of in compliance with federal, provincial, and municipal legislation and any applicable Petro-Canada procedures.

76) A Spill Contingency Plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix A: Spill Contingency Plan) and a Directional Drill Fluid Release Contingency Plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix B: Directional Drill Fluid Release Contingency Plan) have been developed for the Project.

77) Petro-Canada will visually inspect aboveground tanks on a regular basis as per Alberta Energy Resources Conservation Board *Directive 055* (ERCB 2001). Should a leak be detected, remedial action will be immediately taken. Potential remedial actions include replacement of the tank, clean up and disposal of contaminated soils, tank repair or installing drip trays, as required. Additionally, the sour water storage tank will be instrumented for level monitoring and remote shut down.

78) Consistent with the Spill Contingency Plan (see 2008 Environmental Protection Plan [JWA 2008]), liners or secondary containment will be implemented under any hydrocarbon or chemical storage tanks. Liners or secondary containment will be sufficiently large to capture drips from load out valves.

79) Fuel and other potentially hazardous materials will not be stored within 100 m of a watercourse.

80) No fuelling of vehicles and mobile construction equipment will take place within 100 m of a watercourse.

81) Ensure generators, pumps, an other portable equipment used for dewatering have secondary containment.

82) A Wildfire Control Supplement (see 2008 Environmental Protection Plan [JWA 2008], Appendix C: Wildfire Control Supplement) has been developed for the Project and will be followed.

83) Petro-Canada will monitor weather reports and determine if weather conditions (e.g., heavy rain, snow, thawing weather) could adversely affect Project construction activities. Petro-Canada will modify the construction schedule in accordance with local weather and site conditions.

84) Where adverse weather conditions and Project activities have the potential to cause wind erosion, water erosion, soil degradation and sedimentation, Petro-Canada will modify or suspend that phase of the operation until weather conditions abate or effective mitigation procedures have been implemented.

85) Contingency plans implemented before shutdown may include measures such as installation of temporary diversion berms on steep slopes; installation of erosion control matting, silt fencing or EnviroBerms; and change in equipment (i.e., low pressure tires or tracked vehicles).

86) When available and practical, tracked equipment may be employed for specific activities to reduce compaction and rutting risks.

87) Erosion and sediment control measures (e.g., see 2008 Environmental Protection Plan [JWA 2008], Appendix D: Construction Typicals) will be installed during construction activities. Environmental inspectors and the construction supervisors will ensure that mitigation techniques and structures for erosion and sediment control are

   a) installed and working properly;

   b) inspected and maintained regularly as well as after major storms; and

   c) monitored until disturbed areas are stabilized.

88) The monitoring plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix J: Monitoring Plan) will address sedimentation and erosion control monitoring post-construction.

89) Where required, silt fence, rip rap and other stabilization techniques will be used if needed to stabilize and re-vegetate exposed soils.

90) Seeding, matting, slash spreading, rip rap and other stabilization techniques will be used if needed to stabilize and re-vegetate exposed soils.

91) Use interim erosion control and reclamation materials (e.g., silt fencing, hydromulch) that blend with the surrounding landscape colour to the extent practical.

92) To protect rare plant areas near the Project footprint, they are identified on construction alignment sheets (see 2008 Environmental Protection Plan [JWA 2008], Appendix F: Construction Alignment Sheets) and will be flagged before the start of construction.

93) Mitigation of rare plants and the rare vegetation community (see page 15, 2008 Environmental Protection Plan [JWA 2008], Figure 3: Pre-Construction Environmental Surveys Required along the Trunk Line) will be reviewed with contractor personnel in advance of construction to ensure an understanding of the procedures involved.

94) Techniques for narrowing the pipeline right-of-way will be considered in several locations to avoid limber pine. Another technique that may be used is installation of pre-welded and pre-tested sections.

95) Petro-Canada will develop a mitigation strategy for spoon-leaf moonwort (*Botrychium spathulatum*).

96) A palaeontological monitoring plan (see 2008 Environmental Protection Plan [JWA 2008], Appendix D: Palaeontological Monitoring Plan) has been developed for the Project and will be followed.

97) If historical or palaeontological features not previously identified are found on Project sites during construction, cultural or palaeontological specialists, in addition to the construction supervisor, will be consulted to determine the appropriate course of action. Work will be temporarily halted at the location where the discovery was made while paleontologists or archaeologists are consulted. Work may continue outside a buffer established around the discovery site.

98) A cultural protection plan will be implemented.

99) Petro-Canada will retain cultural resource monitors from First Nations during the construction, clearing and excavation of the right-of-way.

100) Assuming access is received, roads to be used for access within the Eden Valley Indian Reserve will be suitably graded prior to construction.

101) Petro-Canada will maintain the access road through the Eden Valley Indian Reserve during the construction access period (exact location, type and schedule of maintenance are to be determined).

102) Snow will be ploughed/removed from the Eden Valley access roads to allow for emergency evacuation/egress (exact location, type and schedule of maintenance are to be determined).

103) Following construction, access roads used by Petro-Canada will be re-graded to a suitable state.

104) Mitigation commitments made to Indian Graves Campground (IGC) are contained in a letter filed with ERCB dated 11 November 2008. The letter covers a number of mitigation measures specific to IGC including:

a) security patrols for access management on long weekends during first year of operations;

b) establishment of communication facilities at IGC (e.g. cell towers, land line-method to be determined);

c) evaluation and possible addition of shelter-in-place capacity;

d) H_2S awareness initiatives;

e) timing considerations for trunk line construction; and

f) renting of campsite spaces.

105) If an environmental non-compliance is identified, the construction supervisor, in consultation with the project manager, will make a determination to either modify the work practice or shut down the activity until corrective actions are determined and implemented. Regulators will be notified as required.

Clearing and Timber Salvage

1) Rare plant, wildlife, archaeological and palaeontological sites and features will be identified by colour-coded flagging tape. The right-of-way has been assessed and adjusted to avoid such features prior to clearing. Any sensitive environmental feature found adjacent to the right-of-way with potential to be affected indirectly by clearing will be flagged to ensure its avoidance.

2) Limber pine trees in the gathering system will be identified prior to clearing to assist in avoidance or salvage measures (see page 13, 2008 Environmental Protection Plan [JWA 2008], Figure 2: Pre-Construction Environmental Surveys Required in the Gathering System, for specific locations).

3) Construction (including roads, pads and pipelines) and drilling (including completions) activities will be restricted in the 06-15 well pad area (Sec. 15, 16, 22, 23, 25 and 26-18-05W5M and Sec. 30 and 31-18-04W5M) from January 1 through April 30 to accommodate the winter ungulate sensitive timing period (se page 11, 2008 Environmental Protection Plan [JWA 2008], Figure 1: Project Specific Timing Windows – Gathering System).

4) Construction (including roads, pads and pipelines) and drilling (including completions) activities will be restricted in the 01-02 well pad area (02-18-05W5M, 35-17-05W5M, N-26-17-05W5M and NW-25-17-05W5M) from January 1 through June 30 to accommodate the winter ungulate and spring lambing sensitive timing period (see page 11, 2008 Environmental Protection Plan [JWA 2008], Figure 1: Project Specific Timing Windows – Gathering System).

5) Construction (including roads, pads and pipelines) and drilling (including completions) activities will be restricted in the 10-25 well pad area (Sec. 26, 26, 35, and 36-17-05W5M and Sec. 30 and 31-17-04W5M) from January 1 through April 30 to accommodate the winter ungulate sensitive timing period (see page 11, 2008 Environmental Protection Plan [JWA 2008], Figure 1: Project Specific Timing Windows – Gathering System).

6) Construction (including roads, pads and pipelines) activities will be restricted in the 03-19 area (Sections 17, 18, 19, and 20-17-04W5M) from January 1 through April 30. Drilling and completions activities may continue through the winter months (see page 11, 2008 Environmental Protection Plan [JWA 2008], Figure 1: Project Specific Timing Windows – Gathering System).

7) Construction (including roads, pads and pipelines) and drilling (including completions) activities will be restricted in the 07-07 and 08-07 well pad area and central facility area (06, 07, and 08-17-04W5M plus portions of 05-17-04W5M, 31-16-04W5M and 32-16-04W5M) from January 1 through April 30 (see page 11, 2008 Environmental Protection Plan [JWA 2008], Figure 1: Project Specific Timing Windows – Gathering System).

8) In areas of high grizzly bear-denning potential, as identified on Figures 2 and 3 (Pre-Construction Surveys Required in the Gathering System and along the Trunk Line; pages 13 and 15, 2008 Environmental Protection Plan [JWA 2008]), where construction activities are scheduled to occur during the winter denning period (i.e., November to March), pre-clearing surveys may be conducted to located, identify and, if necessary, establish a protective buffer around active bear dens. Petro-Canada will notify Alberta Sustainable Resource Development to discuss the need for surveys and to develop site-specific protection plans if a den is located.

9) In areas where vegetation removal is required within the migratory bird breeding window (i.e., May 1 to July 15), pre-clearing nest surveys for breeding birds will be conducted prior to vegetation clearing. Nest surveys will include tree, cavity and ground nesting birds.

10) Vegetation clearing will be conducted outside the harlequin duck nesting-window (May 1 to August 1) near the Highwood River, Flat Creek, Miller Creek, Pekisko Creek and Salt Creek (see Figures 2 and 3; Pre-Construction Surveys Required in the Gathering System and Along the Trunk Line; pages 13 and 15, respectively, 2008 Environmental Protection Plan [JWA 2008]). Alternatively, pre-construction harlequin duck surveys should be conducted at these crossings. Horizontal directional drilling (HDD) under some of these watercourses is planned and will help to further mitigate effects on habitat near those crossing locations.

11) Two inactive wolf dens have been identified in the Project area (refer to Figure 3: Pre-Construction Surveys Required Along the Trunk Line; page 15, 2008 Environmental Protection Plan [JWA 2008] for locations). The migratory bird restricted activity period may be extended by 15 days to cover of the period from April 15 to July 15 within 1 km of identified wolf dens and rendezvous site. If clearing or construction activities within 1 km of the identified wolf dens or rendezvous site are expected to occur during the April 15 to July 15 window, pre-construction surveys should be initiated after March 15 to determine if the dens are active that year. If the dens are found to be occupied, the restricted activity period could be adjusted. Alternately, construction activity on this portion of the right-of-way can be delayed to a time period following July 15, then wolves would be less sensitive to disturbance having left the dens and able to use alternative rendezvous sites.

12) A riparian buffer (minimal disturbance zone [MDZ]) will be established for all watercourses, and will be flagged using colour-coded flagging tape prior to the start of clearing activities. Disturbance inside the MDZ will be minimized to the extent practical, including narrowing the right-of-way (access, however, is still required for clearing and construction crews to cross the watercourse).

13) Timber salvage will be conducted in accordance to the Spray Lake Sawmills' timber harvest specifications (refer to Appendix M: Timber Salvage Plan, 2008 Environmental Protection Plan [JWA 2008]), which includes specifications on skidding and timber deck locations.

14) Along the right-of-way, timber salvage will be conducted in accordance with the timber salvage plan (Appendix M: Timber Salvage Plan, 2008 Environmental Protection Plan [JWA 2008]), which includes specifications on skidding and timber deck locations.

15) Where practical, apply curvilinear (irregular) edge treatment of pipeline and road right-of-ways to reduce line of sight. Areas where this is planned are referenced on the reclamation

alignment sheets (Appendix G: Reclamation Alignment Sheets, 2008 Environmental Protection Plan [JWA 2008]).

16) Pending approval with Alberta Sustainable Resource Development, clearing for visual mitigation is proposed in three areas along the trunk line in which trees will be felled but stumps will not be removed. For locations refer to Appendix I: Reclamation Plan, Section 1.5: Detailed Reclamation Plans for Sensitive Areas, 2008 Environmental Protection Plan [JWA 2008].

17) During clearing, trees will be felled towards the right-of-way wherever practical. Leaners or felled trees that inadvertently fall into adjacent undisturbed vegetation will be bucked into manageable lengths, and removed to the right-of-way or approved workspace.

18) All trees damaged during clearing and construction will be felled immediately and removed from the right-of-way. A damaged tree is defined as one that has fractures or has bark loss of 30 per cent or more of its circumference.

19) If trees infested with mountain pine beetle are noted during pre-construction surveys, the Alberta Sustainable Resource Development forest officer will be notified.

20) Skidding of timber across watercourses is strictly prohibited.

21) Any springs or seeps identified during clearing will be avoided to the extent practical. Minor reroutes may be required. If springs or seeps cannot be avoided, flow diversion and management measures will be employed (e.g., subdrains). Major springs and seepage areas are identified in Appendix F: Construction Alignment Sheets (2008 Environmental Protection Plan [JWA 2008]). The location of any additional springs or seeps identified during clearing will be documented and communicated to road and pipeline construction supervisors.

22) Crossing of wetlands during construction will target frozen conditions and will employ methods such as corduroy, swamp mats or rig mats to protect the wetland during equipment travel.

23) Environmental inspectors retained during construction will travel ahead of the pipeline spread, and will identify sensitive locations, such as seeps and springs, where Petro-Canada may have to install specific mitigation measures such as diversion ditches in order to divert water off the right-of-way.

24) Merchantable timber will be cleared, bucked, limbed and decked for pick up by Spray Lake Sawmills. Timber will be decked on the working side of the right-of-way only in salvage deck locations.

25) Log decks will not be located in any environmentally sensitive areas, which include wildlife mineral licks, rare plant and rare plant community locations, historical assessment (historical resource) sites and grasslands with a significant rough fescue component (see Appendix F: Construction Alignment Sheets, 2008 Environmental Protection Plan [JWA 2008]).

26) Timber will be trucked to Spray Lake Sawmills directly from the salvage deck location. However, if equipment availability, inclement weather or other factors restrict haul timing, decked timber may be forwarded to interim locations off the right-of-way so that other contractors can initiate their work on the right-of-way.

27) Appropriate fire response measures are outlined in the Appendix C: Wildfire Control Supplement (2008 Environmental Protection Plan [JWA 2008]).

28) Personnel will be made aware of proper disposal methods for welding rods and other hot or burning material.

29) Personnel will smoke only in designated smoking areas and dispose of butts in appropriate receptacles.

30) Non-merchantable logs will be used for rollback, erosion control, firewood donations or piled and burnt with the non-merchantable slash. Burning will be conducted in accordance with fire permits.

31) Non-merchantable timber, slash and rubbed roots will be salvaged as rollback and spread back for erosion and access control in selected locations, as identified in Appendix L: Access Management Plan (2008 Environmental Protection Plan [JWA 2008]). Non-merchantable timber may also be retained for use as corduroy or may be burned.

32) Designated areas along the pipeline have been identified for the application of rollback to discourage travel down the pipeline right-of-way. Specific rollback locations are indicated in Appendix G: Reclamation Alignments Sheets (2008 Environmental Protection Plan [JWA 2008]), with further details identified in Appendix L: Access Management Plan (2008 Environmental Protection Plan [JWA 2008]).

Grading and Topsoil Handling

1) Full width stripping will be conducted at pads, roads and right-of-ways with the exception of designated areas (see below).

2) Top soils and duff will be stripped to colour change and salvaged separately from subsoil.

3) In areas with a high conservation value rough fescue component, the preferred method of topsoil handling will be ditchline stripping only using a track hoe. This method is highly weather dependent and will only be attempted under dry or frozen conditions. Partial sod salvage (salvaging the sod layer in clumps) may be conducted to the extent practical in these areas (see Appendix E: Construction Typicals, 2008 Environmental Protection Plan [JWA 2008], for a typical drawing), as indicated in Appendix F: Construction Alignment Sheets, (2008 Environmental Protection Plan [JWA 2008]). These areas include portions of

   - NE-26-17-05W5M,
   - NE-28-16-04W5M,
   - SW-02-14-04W5M,
   - NE-35-15-04W5M, and

- SW-17-15-03W5M.

Alternatively, individual fescue plants will be salvaged and stored for later replacement on the right-of-way. Fescue plugs will be planted to complement fescue plant transplanting and seeding in these locations.

4) Fescue sod layers will be temporarily stored on geo-textile fabric.

5) Protective matting will be used on travel corridors over rough fescue dominated grasslands.

6) In areas with high palaeontological potential, a professional palaeontologist will be on site during stripping and grading to monitor for the presence of fossils of high heritage value. These areas include

   - Summit Pass (10 and 11-26-14-04W5M),
   - Livingstone Range (16-26-14-04W5M, 01-35-14-04W5M and 04-36-14-04W5M),
   - Highwood River Crossing (SW-05-17-04W5M and NW-32-16-04W4M),
   - Tributary to Flat Creek (01 and 02—02-18-05W5M), and
   - Miller Creek (SE-33-16-04W5M).

   Refer to Appendix D: Palaeontological Monitoring Plan, 2008 Environmental Protection Plan (JWA 2008), for more information.

7) If stripping and grading crew members uncover what appears to be an archaeological or palaeontological artifact of high heritage value (e.g., dinosaur bone, human remains, campsite), stripping and grading activities should be temporarily halted at that location until the Project manager is contacted. The Project manager will consult with the project archaeologist or palaeontologist.

8) Petro-Canada has developed grade plans for the new access roads, well pads and central facility (Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]). Grade planning included input from environmental engineering and construction personnel. Preliminary grade plans were presented to Alberta Sustainable Resource Development for review.

9) Petro-Canada has developed detailed plans for the pipeline right-of-way including sediment and erosion control plans for selected locations. These plans will be used as guidelines for contractors; however, final decisions will be made in the field based on site-specific conditions (Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]).

10) Approval for any additional temporary workspace required for storage of grade or ditch spoil during construction will be obtained from Alberta Sustainable Resource Development prior to construction.

11) Topsoil handling will be reduced to the extent practical.

12) Topsoil will be salvaged from all areas of ground disturbance prior to grading or site preparation. To prevent the loss of topsoil through pulverization, topsoil will be placed where it can be stored without additional disturbance to avoid excessive handling.

13) Topsoil and subsoil will be stored separately. All soils will be stored in a location and in a manner that prevents stored soil from entering riparian zones and watercourses.

14) The length of time between stripping and replacement of stored soils should be reduced to the extent practical during construction.

15) Stockpiled soils will be conserved in low-profile berms and protected from wind and water erosion.

16) If there is potential for erosion of topsoil salvage piles, tackifier or erosion control matting may be applied if they are to be exposed for more than one growing season.

17) Long-term topsoil storage piles will be mapped and documented in post-construction as-built reports to prevent future disturbance and loss.

18) Plans for grading and topsoil handling for pads and portions of the road and pipeline corridors in the gathering system area and along the trunk line can be found in Appendix I: Reclamation Plan (2008 Environmental Protection Plan [JWA 2008]).

Construction Plans

1) Drainage ditches will be installed along the bottom of well pad cut slopes to capture and divert runoff and intercepted groundwater and to prevent water flow onto the pad.

2) All surface runoff and erosion control on well pads and the facility site will be controlled.

3) Silt fences and diversion berms will be installed in conjunction with drainage ditches and around topsoil piles to divert water around the well pad and soil piles.

4) Check dams, energy dissipaters, biologs or wattles will be incorporated in all ditch construction to control rate of flow and sedimentation.

5) Sediment containment basins may be constructed to control and separate sediment particles resulting from runoff.

6) Erosion control measures will be employed until re-vegetation is sufficient to mitigate erosion risks.

7) All crossing structures will be designed to meet or exceed expected flow during their period of operation. Temporary crossing structures and associated sediment and erosion control structures will be designed to accommodate expected flows during the construction and clean-up phase, and will be regularly monitored and maintained.

8) A preliminary strip and grade plan has been prepared for the central facility. The plan estimates cut and fill slopes required to construct the facility pad, indicates locations for topsoil storage, off-and-on-lease drainage control, and sediment and erosion control

measures. A reclamation plan has also been developed (Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]).

9) The pipeline from the 03-19 well pad will largely parallel the access road. Petro-Canada has developed a specific grading plan to minimize the total width of disturbance required to construct the road and install the pipeline.

10) A cattle guard will be installed on the 03-19 access road at the existing fence location between Sections 8 and 17 to control cattle movement.

11) A grading plan has been developed for the 03-19 well pad. The plan estimates cut and fill slopes required to construct the well pad; details locations for topsoil storage, off and on lease drainage control; and sediment and erosion control measures. A construction phase reclamation plan has also been developed (Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]).

12) The pipeline from the 01-02 well pad will parallel the access road for approximately one-third of its length. Petro-Canada has developed a grading plan for the road to minimize the total width of disturbance required to construct the road and install the pipeline.

13) Construction drawings have been developed for two incised watercourses (WC 2 and WC 3) by geo-technical engineers to address unique construction and sedimentation and erosion control requirements at these sites (see Appendix H: Watercourse Crossing Site Plans, 2008 Environmental Protection Plan [JWA 2008]).

14) A site-specific sediment and erosion control plan has been prepared for the 01-02 access road to prevent sedimentation into the Flat Creek drainage (Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]). This plan will be used as a guide; however, measures will be implemented based on field conditions.

15) A preliminary strip and grade plan has been prepared for the well pads. The plans estimate cut and fill slopes required to construct the well pad and details locations for topsoil storage (see Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]). A construction phase reclamation plan has also been developed for each pad (see Appendix I: Reclamation Plan, 2008 Environmental Protection Plan [JWA 2008]).

16) After the lease has been expanded at 10-25, a fence may be installed around the lease. Fencing will be determined following construction. A drift fence will be installed on the east side of the expansion area. A cattle guard will be installed in 10-25-17-05W5M.

17) On the 01-02 access road, a drift fence and cattle guard will be installed in NE-35-17-05W5M to control cattle movement.

18) A drift fence will be installed south of the 06-15 well pad. The allotment holder will be contacted during lease construction to finalize fence installation details.

Permanent Access Watercourse Crossings

1) Petro-Canada will obtain all applicable permits and authorizations before the start of watercourse crossing construction.

2) Petro-Canada will notify Department of Fisheries and Oceans Canada at least 14 days before the start of construction work on any watercourse crossing.

3) Restrict grubbing and topsoil/duff stripping within the riparian minimal disturbance zone (MDZ) to that required to allow vehicle crossing during construction.

4) Ensure that the crossing approaches are graded to stable slopes and erosion and sediment control measures such as sediment fence, matting or temporary berms are installed prior to and during construction to protect the watercourse, as per the specification in Appendix F: Construction Alignment Sheets (2008 Environmental Protection Plan [JWA 2008]).

5) Existing access crossing structures will be used where available and suitable.

6) Conditions and environmental protection measures for clear-span bridges will follow as outlined in the most recent version of the Department of Fisheries and Oceans Canada *Alberta Operational Statement* (DFO 2007b, internet site).

7) Machinery fording a watercourse to bring equipment required for construction activities to the opposite side of a watercourse will be limited to a one-time event (over and back) (except Cutthroat Creek and Flat Creek where no vehicle crossings are permitted, subject to the success of the horizontal directional drill crossing). Where stream bed and banks that are highly erodible (e.g., dominated by organic materials and silts) and significant erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure (e.g., clear-span bridge) will be placed instead of fording.

8) Culverts of sufficient size will be installed to pass greater than expected high flow conditions. Culverts are expected to be installed where possible during dry conditions. If flowing water is present, flow will be diverted (dam and pump, dam and flume) to isolate the installation site. A qualified aquatic environment specialist (QAES) will be consulted to identify any fish habitat concerns if isolated construction is required when water is present. Contingency equipment (e.g., back-up pumps, hoses) will be available on site.

9) Inlet and outlet protection (e.g., silt fence biologs, wattles, culvert socks) will be used on all culverts along with rip-rap if required. Once re-vegetation is successful, inlet and outlet protection will be removed.

10) When constructing permanent ford locations (for operations access), ensure that fords are v-notched (approximately 6 inches) to ensure water flow and fish passage/protection across the ford.

11) Bridge abutments (except for the Highwood River crossing, which will have instream abutments) will be placed outside the normal high water mark. Wing walls and associated sediment and erosion control structures will be used to prevent sediment from entering watercourses from roads.

12) Bridges without solid surface decks will be lined with geotextile to prevent sediment losses to waterbodies from vehicles and equipment using bridges.

13) Fuel and other potentially hazardous materials will not be stored within 100 m of a watercourse.

14) No fuelling of vehicles and mobile construction equipment will take place within 100 m of any watercourse except for pumps used during an isolated crossing, which will have secondary containment.

15) Ensure generators, pumps and other portable equipment used for dewatering have secondary containment.

16) Monitor weather reports and determine if a clear window exists for the expected duration of the crossing. Petro-Canada will approve the proceeding of work in consideration of local weather, site conditions and construction schedule. Where the expected duration of the crossing is longer than available weather predictions, the decision to suspend or continue the work will be based on site-specific conditions.

17) Upon completion of the crossing, all disturbed areas will be stabilized as soon as practical until such time that reclamation activities are complete.

18) Site-specific reclamation measures for each watercourse are presented in Appendix H: Watercourse Crossing Site Plans (2008 Environmental Protection Plan [JWA 2008]).

19) Petro-Canada will identify degraded crossings in the Project area that may be potential restoration projects work (in co-operation with Alberta Sustainable Resource Development and Trout Unlimited).

Drilling and Completions

1) The rig, tank farm and other potential contamination sources will use secondary containment such as liners wherever practical.

2) All water used during drilling and completions will be collected, tanked and removed for disposal at an approved facility.

3) During drilling and completions, Petro-Canada will use secondary containment systems such as bermed liners with at least 110 per cent capacity of the largest tank (e.g., drilling fluid, fuel tanks).

4) A liner will be placed under the rig substructure and through rig ditches to capture rig wash and substructure runoff.

5) Rig ditches will drain into catch tanks and rig wash will be stored and tested according to Alberta Energy Resources Conservation Board *Directive 055* (ERCB 2001) criteria and released, treated or disposed of appropriately.

6) All on-site rig shacks will have self-contained aboveground septic tanks that will be pumped out and trucked for disposal at an approved facility.

7) Drip pans or absorbent pads will be placed under high potential sources of containment leaks that are not located over liners or other secondary containment.

8) All HT-40 cuttings will be stabilized and mixed with absorption material, stored in a shale tank and hauled off site for disposal according to Alberta Energy Resources Conservation Board *Directives 050* (ERCB 1996) and *058* (ERCB 2006a).

9) Gel-chem drilling waste will be disposed of by land-spraying while drilling (LWD) (outside of the Project area) or stabilized and hauled with the drilling cuttings to an approved facility.

10) No on-site composting of drilling wastes will occur.

11) No on-site land-spraying of drilling wastes will occur.

12) All cement pits on multiwell pads must be approved by Alberta Energy Resources Conservation Board under *Directives 050* (ERCB 1996) and *058* (ERCB 2006a).

13) Spill kits will be kept close to Project sites and heavy equipment, and in service trucks during drilling and completions.

14) A sea can container with spill response equipment will be stationed near Project sites, as indicated in Appendix A: Spill Contingency Plan (Environmental Protection Plan [JWA 2008]).

15) No fuelling or fuel storage is permitted within 100 m of a watercourse.

16) The surfing casing will be cemented below all known aquifers and to a maximum depth of approximately 600 m.

17) Multiple wells will be drilled sequentially from the well pads (i.e., 03-19, 01-02, 10-25 and 06-15).

18) Temporary fencing around active well pads during drilling and completions will be used to restrict cattle access, where required.

19) Additional sound suppression devices (e.g., mufflers) may be used on drilling-related equipment and rig engines to further dampen noise levels.

20) Petro-Canada will prepare and submit a flare management plan for each well prior to well clean-up/flow rate flare test, in accordance with Alberta Energy Resources Conservation Board (ERCB) *Directive 060* (ERCB 2006b). The flare management plan will comprise ambient monitoring to ensure the SO_2 Alberta Ambient Air Quality Objective (AAAQO; AENV 2005) is not exceeded.

21) Petro-Canada will work with Health Canada and the Eden Valley Indian Reserve to assess suitability of homes for sheltering-in-place.

22) Relevant portions of the Emergency Response Plan will be translated into the Stoney language.

23) Eden Valley Indian Reserve has an emergency management disaster services plan which is currently limited in scope. Petro-Canada intends to work with Eden Valley and Health Canada to help develop a comprehensive plan.

24) Petro-Canada will provide H_2S Alive and WHMIS training to all workers from the Eden Valley Indian Reserve employed by Petro-Canada and/or its contractors.

25) Petro-Canada will provide H_2S awareness training and/or information materials to local residents, ranchers, campers and backcountry users. An H_2S Awareness training course will take place on the Eden Valley Indian Reserve.

26) Petro-Canada will attempt to retain and train individuals from the Eden Valley Reserve to act as emergency responders/rovers.

27) A drilling completions and servicing workover supplemental check list will be completed for each well on this Project in support of the Emergency Response Plan.

28) Drilling and service rigs will be equipped with H_2S detection.

29) An air quality monitor will be located on the Eden Valley Indian Reserve during flaring of the 08-07 well.

30) In-line production testing will be conducted to reduce SO_2 emissions and conserve gas. Intermittently during in-line testing, sour vapours will be directed to a flare.

Pipeline Construction

1) As required, gaps or breaks will be left in strung pipe to allow for wildlife and cattle movement, drainage and access by allotment holders.

2) Used welding rods, bevel shavings and pipe coating materials will be collected and disposed of at an approved facility.

3) Minimize the amount of open trench at any one time, to the extent practical. The amount of open trench permitted at any one time will take into consideration the stability of the trench, the prevailing weather conditions, safety and environmental concerns.

4) To facilitate free movement of livestock and wildlife, trenching operations will be followed as closely as practical by backfill operations.

5) Where a trench is left open, escape ramps will be constructed at trench ends to prevent wildlife entrapment.

6) Hydrovac wastes will be disposed off site at an approved waste disposal facility.

7) Where practical, grade the right-of-way to divert surface water away from the open trench.

8) Appropriate measures (e.g., erosion and sediment control structures, sumps, pumping excess water onto well-vegetated areas) will be implemented to prevent sediment-laden water from entering a watercourse during ditching.

9) Trench water controls will be installed, where deemed appropriate to prevent water flow along the trench. These measures include trench plugs, cut-off ditches to carry water onto well-vegetated areas and berms. Ensure trench plugs and breakers consist of material with low permeability that will effectively block water flowing along the trench.

10) Water levels in open trenches will be monitored.

11) If trench water levels reach equilibrium and remain below the trench take-off location, the trench will only be dewatered for pipe installation.

12) If water levels or flow rates in the trench might overwhelm existing trench water control measures (e.g., if heavy rains are forecast), the trench will be de-watered and temporarily backfilled or covered.

13) Ensure pumped trench water does not directly enter any watercourse or wetland.

14) Leave breaks in spoil piles to ensure trench water accumulated behind trench plugs is directed into well-vegetated areas.

15) Temporary fencing will be erected around open trench and bellhole excavations when unsupervised.

16) If the trench requires de-watering before lowering-in, water will be pumped into settling ponds, filter bags, or onto stable, well-vegetated areas off right-of-way in a manner that does not cause erosion or sedimentation.

17) The discharge area will be monitored. It will be changed if the discharge location conditions become saturated to the point that adequate natural filtration is no longer practical.

18) Topsoil and subsoil well not be mixed during trench backfilling.

19) Petro-Canada will use very limited amounts of sand and gravel. If required, this will be stored on the right-of-way.

20) Under frozen soil conditions all available soil from the ditching activities will be backfilled and slightly roached to account for anticipated ditchline subsidence from thawing, moisture from spring runoff and precipitation.

21) Where localized high coarse fragment content is present in the replaced trench spoil, coir erosion control fabric will be laid over the replaced trench spoil prior to topsoil replacement, where practical. Topsoil will then be replaced over the trench and seeded. The fabric will prevent the topsoil from being lost in the voids of the replaced trench spoil during periods of high precipitation.

22) Excess spoil material displaced by the pipe will be spread evenly over the stripped area to ensure acceptable crown heights prior to topsoil placement.

23) When construction is complete, windrowed salvaged topsoil will be spread on exposed slopes and ditches.

24) Where a slight roach is used, openings will be left in roaches and crowns at appropriate locations to allow for cross right-of-way drainage.

25) Trench plugs and subdrains will be installed as required to control subsurface and surface water flow.

26) All appropriate permits or licences will be obtained from regulatory agencies for water withdrawal and discharge for hydrostatic testing of the pipeline. Mitigation measures will ensure pressure testing activities are conducted in accordance with all approval conditions, permits and Codes of Practice.

27) If used, methanol will be stored, transported and disposed of in compliance with regulatory requirements.

28) Alberta Environment's *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines*) (*Water Act*) (AENV 1999b) will be reviewed and used to guide requirements for notification, sampling and reporting.

29) Water volumes taken will not exceed those outlined in *Schedule 4 of the Water Regulations for the Green Area* (i.e., 5000 m^3) (AENV 1998).

30) All water intakes will be screened in accordance with the Department of Fisheries and Oceans Canada *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995) and screens will be maintained clear of debris.

31) Alberta Environment's Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines (Environmental Protection and Enhancement Act) (AENV 1999a) will be complied with in full.

Pipeline Watercourse Crossings

1) Petro-Canada will obtain all applicable permits and/or authorizations before the start of watercourse crossing construction. Petro-Canada has developed a comprehensive planning, design and mitigation document for watercourse crossings (see Appendix H: Watercourse Crossing Site Plans, 2008 Environmental Protection Plan [JWA 2008]).

2) Department of Fisheries and Oceans Canada's (DFO) *Operational Position Statements for Pipeline Crossings in Alberta* regarding high pressure directional drilling (DFO 2007e, internet site), punch and bore crossings (DFO 2007f, internet site), temporary stream crossings (DFO 2008a, internet site) and isolated or dry open-cut stream crossings (DFO 2008b, internet site) will be followed. Where crossings were submitted to DFO for case-by-case review, all conditions in any Letter of Advice or Authorization issued by DFO will be followed.

3) Petro-Canada will notify Department of Fisheries and Oceans Canada and Alberta Environment (under the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body [AENV 2000]) at least 14 days before the start of construction work on any watercourse crossing.

4) In addition to an environmental inspector, a qualified aquatic environment specialist (QAES) may be present during construction at all watercourse crossings with moderate to high fish habitat sensitivity to monitor water quality and document compliance with Project plans, commitments and approval conditions (e.g., sediment and erosion control), and ensure that hydrological characteristics of the watercourses (e.g., sediment levels) and aquatic resources are conserved.

5) Signs may be posted 50 m from each watercourse or the top of the valley slope, whichever is greater, to alert traffic to the upcoming watercourse.

6) Restrict grubbing and topsoil and duff stripping within the riparian minimal disturbance zone (MDZ) to allow access crossing construction (if required), excavation of the trench and installation of the pipeline.

7) Delay grading on approach slopes to watercourses until immediately before construction of the pipeline crossing. Where this may not be practical, appropriate temporary erosion and sediment control structures will be installed immediately upon initial disturbance of the vegetative mat and topsoil/duff stripping.

8) Ensure the right-of-way is graded to a stable slope, and erosion and sediment control measures such as sediment fences, matting or temporary berms are employed to protect the watercourse.

9) Ensure all topsoil and subsoils are stored separately, and in a location and manner that prevents soil entry into the watercourse.

10) Fuel and other potentially hazardous materials will not be stored within 100 m of a watercourse.

11) No fuelling of vehicles and mobile construction equipment will take place within 100 m of any watercourse except for pumps used during an isolated crossing, which will have secondary containment.

12) Ensure generators, pumps and other portable equipment used for dewatering have secondary containment.

13) Before the installation of the watercourse crossing and the start of instream activity, all necessary equipment and materials will be available and on site. Contingency equipment (e.g., back-up pumps) will also be available on site. All equipment will be checked for fuel and hydraulic leaks and performance.

14) To minimize the length of instream activity, efforts will be made to ditch, lower in and backfill watercourse crossings in the same working day.

15) When implementing a trenched (open-cut or isolated ditch) pipeline installation method, gravel or cobble substrates located in the watercourse will be salvaged and stockpiled separately from excavated ditch spoil. These course substrates will be used to cap the instream portion of the trench line.

16) Locate appropriate upland filtration sites for dewatering of trench water prior to construction of the crossing.

17) Install upstream dam prior to downstream dam.

18) Ensure any water pumped from the excavation area is discharged into a sediment trap, filter bag or vegetated area to allow sufficient filtering of suspended solids.

19) Fish salvage will be completed on all watercourse crossings with flowing water before the start of pipeline installation.

20) Pumps used during any phase of trenched crossing construction will be fitted with intake screen in compliance with the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995). Screens will be maintained clear of debris.

21) Construct dams using appropriate methods and materials for the size and substrate of the watercourse to minimize the amount of instream disturbance that may arise from dam installation. Methods and materials may include sand bags with or without polyethylene liner, sheet pile, aqua dam, cobble, well graded course gravel fill or rock fill.

22) Ensure dams provide effective isolation of the watercourse flow from the work area (see Appendix H: Watercourse Crossing Site Plans, 2008 Environmental Protection Plan [JWA 2008]).

23) Locate dams sufficiently beyond the trench area to ensure the integrity of the dams will not be at risk during trenching, and potential sloughing of the trench.

24) Place discharge hoses to ensure that all pumped water re-enters the watercourse channel and maintains flow below the downstream dam and below any ice present downstream.

25) Pumps will be monitored to ensure continuous operation until the trench is completely backfilled.

26) Flumes may be used as an alternate isolation measure. Ensure that the length of the flume(s) is adequate so that trench sloughing will not threaten the integrity of the crossing. Install an energy dissipater or baffle at flume discharge where the potential for erosion or scour of the watercourse bed exists.

27) Horizontal directional drill paths will be designed by the drilling contractor and Petro-Canada.

28) Horizontal directional drills of the Highwood River and Flat Creek will be deferred to periods following August 1 or prior to May 1 to avoid overlapping the critical harlequin duck nesting window, or alternatively pre-construction harlequin duck surveys will be conducted.

29) Drilling fluid composition will be limited to betonite, fresh water, and if warranted, other inert additives.

30) Entry and exit points for horizontal direction drills will be placed a minimum of 25 m from the high water mark of the above-listed watercourses to the extent practical.

31) The drilling rig will be placed outside of the riparian vegetation strip to protect the area. This applies in particular to the drill under Flat Creek.

32) A subsoil berm will be constructed downslope from entry and exit points to contain any fluid that may be released during pullback or other drilling operations.

33) Surface casing will be installed at the entry point to a depth that extends beyond the coarsest material.

34) Surface casing will be installed at the exit point after completion of the pilot hole if coarse textured near-surface deposits could interfere with drilling fluid circulation.

35) See Appendix B for the Directional Drill Fluid Release Contingency Plan (2008 Environmental Protection Plan [JWA 2008]).

36) Existing access crossing structures will be used where available.

37) No construction or vehicle access over Cutthroat Creek or Flat Creek is permitted, subject to the success of the horizontal directional drill crossing.

38) Conditions and environmental protection measures for clear-span bridges will follow as outlined in the most recent version of Department of Fisheries and Oceans Canada's *Alberta Operational Statement* (DFO 20007b, internet site) (see Appendix E: Construction Typicals, 2008 Environmental Protection Plan [JWA 2008] for typical drawing).

39) Machinery fording the watercourse to bring equipment required for crossing construction activities will be limited to a one-time event (over and back). For stream bed and banks that are highly erodible (e.g., dominated by organic materials and silts) and significant erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure (e.g., clear-span bridge) or other practices will be placed without fording.

40) Appropriately-sized temporary culverts may be used at crossings that do not support fish habitat. Culverts may be lined with geotextile to assist in removal.

41) Access crossing and associated sediment and erosion control has been designed and will be installed based on the maximum flow expected during their period of operation.

42) Where the primary crossing method encounters difficulties or fails:

a) The construction contractor will stabilize the crossing immediately and will control erosion and sediment;

b) No further work will be performed until authorized;

c) The pipeline supervisor and Project environmental advisor will be consulted by the Project manager to develop a contingency plan. A qualified aquatic environment specialist (QAES) will also be consulted;

d) The method and timing of the contingency crossing will require assessment to evaluate what is most appropriate and what regulatory approvals will be required;

e) Approvals will be obtained from the appropriate regulatory agency if required. This will generally entail notification of Department of Fisheries and Oceans Canada and Alberta Environment; or notification of Alberta Environment and a request for Project review by Department of Fisheries and Oceans Canada; and

f) Once approvals are obtained, the selected contingency crossing plan and authorization to proceed will be communicated to the contractor.

43) Monitor weather reports and determine if a clear window exists for the expected during of the crossing. Petro-Canada will approve proceeding in consideration of local weather, site conditions and construction schedule. Where the expected duration of the crossing is longer than available weather predictions, the decision to suspend or continue the work will be based on site-specific conditions.

44) Upon completion of the crossing or temporary diversion, all disturbed areas will be stabilized as soon as practical until such time that reclamation activities are complete.

45) Reclamation measures have been developed for each watercourse crossing. Refer to Appendix H: Watercourse Crossing Site Plans for site-specific measures and Appendix I: Reclamation Plans for general measures (both Appendices H and I are in the 2008 Environmental Protection Plan [JWA 2008]). Measures take into account the planned construction season.

46) Isolated watercourse crossings in areas frequented by cattle may be temporarily fenced until reclamation is complete.

47) Watercourse crossings will be monitored until banks are fully stabilized and on a yearly basis thereafter.

Cleanup and Reclamation

1) Cleanup activities will follow completion of construction operations as closely as practical.

2) Reclamation will be initiated on all disturbed land surfaces within two growing seasons.

3) Where required, the subsoil will be ripped to a sufficient depth to relieve compaction prior to replacement of topsoils.

4) All slopes will be restored to the pre-construction profile to the extent practical.

5) Restore drainage patterns to approximate original conditions by matching that which exists in adjacent area.

6) The topsoil surface will be left "rough" to encourage the establishment of native plant communities.

7) Before replacing topsoils, soil piles will be inspected for weeds and managed appropriately.

8) New posts, bracing and strands will be installed to match the connecting fence. Where required to access emergency shutdown valves during operation, permanent locked gates will be installed, maintained, and kept closed at all times.

9) Fencing may be applied to well sites and emergency shutdown valves. Fencing will be determined following construction.

10) Temporary fencing to exclude cattle from erosion prone slopes and watercourse crossings will be used where required. Fencing and cattle guard options will be discussed with Alberta Sustainable Resource Development and the grazing allotment holders. Consultation will continue through the operations phase to resolve potential cattle-related conflicts.

11) Electric fencing will be used for access control in selected native grassland areas.

12) If the right-of-way must be disturbed for maintenance purposes, the same reclamation and access management procedures used after construction will be implemented.

13) Construction access on the trunk line right-of-way will be maintained until crossing sites are sufficiently stabilized. Following closure of access on the right-of-way, any required remedial work on crossings may be completed using all-terrain vehicle (ATV) or helicopter access.

14) Remove crossing structures (culverts, bridges) when no longer required, and stabilize using seeding and erosion control measures as soon as practical to prevent erosion and subsequent sedimentation.

15) Temporary bridges may be left in place to accommodate reclamation the following growing season.

16) All-terrain vehicle (ATV) access will be impeded on the trunk line right-of-way between 16-03-16-04W5M and 11-24-15-04W5M using rollback to dissuade unauthorized ATV travel (see alignment sheets). A narrow trail along other portions of the trunk line will be left passable to allow operations access to emergency shutdown valve sites (see Appendix L: Access Management Plan, 2008 Environmental Protection Plan [JWA 2008]).

17) Access onto the pipeline right-of-way will be blocked at specific locations using techniques such as rollback, boulders or berms to impede vehicle access (see Appendix G: Reclamation Alignment Sheets and Appendix L: Access Management Plan, 2008 Environmental Protection Plan [JWA 2008]). Rollback or vegetation plantings will be used to impede line of sight, where practical. Access potential along pipeline right-of-ways in the gathering system will be removed during reclamation using rollback, boulders, vegetation plantings or berms.

18) Options for implementing rollback along the pipeline right-of-way where it parallels Highway 532 will be examined. Signage with Alberta Sustainable Resource Development and Alberta Off-Highway Vehicle Association cooperation will be considered to manage off-highway vehicle access along the reclaiming right-of-way.

19) The majority of the pipeline right-of-way will be rolled back with slash and non-merchantable timber to discourage wildlife and cattle use, particularly early in the

reclamation program; and it will also discourage any unauthorized motorized travel along the right-of-way. No rollback will occur in non-treed portions of the right-of-way. Rollback will be non-merchantable conifers and all grades of aspen. Merchantable conifers may also be used in certain areas, subject to Alberta Sustainable Resource Development approval.

20) The amount of roll back used on the trunk line and the locations of rollback will vary. For example, there may be some locations (e.g., the south end of the trunk line, at locations where the trunk line crosses obvious trails) where heavier loads of rollback will be used.

21) In areas of high visibility, Petro-Canada will be doing additional planting that will reduce visual effects, while at the same time maintaining the function of the rollback.

22) Petro-Canada will make representations to Alberta Sustainable Resource Development to temporarily close the area east of Hailstone Butte to all-terrain vehicle users immediately below the pass to protect the area during reclamation.

23) Petro-Canada will follow the *2007 Reclamation Criteria for Wellsites and Associated Facilities* (ASRD 2007). Petro-Canada is targeting establishment of two separate canopies, either a shrub canopy or herbaceous canopy, a shrub canopy and/or an over-storey tree canopy. In open areas, Petro-Canada will be referencing back to the *Native Plant Revegetation Guidelines* (Native Plant Working Group 2001, internet site) which are primarily for herbaceous species. Petro-Canada's goal is to try to return the area to as near a natural condition as it was prior to disturbance.

24) Alberta Sustainable Resource Development will be kept apprised of reclamation activities. Reclamation plans will be filed with ASRD 30 days prior to the date of entry.

25) Petro-Canada is committed to sharing reclamation findings with Alberta Sustainable Resource Development representatives, ranchers and landowners, reclamation practitioners and other oil and gas companies.

26) All shooflies will be restored to their previous condition or better.

27) Sediment and erosion control methods will remain in place and will be regularly monitored until recovery of disturbed areas is sufficiently complete to allow for safe removal of these structures.

28) Any unnecessary temporary erosion and sediment control measures will be removed. Permanent site-specific erosion and sediment control measures will be installed and regularly monitored.

29) To the extent practical, access control measures will be implemented to prevent recreational vehicles from disturbing sties during reclamation.

30) After facilities are installed, well pads will be re-contoured to a tear drop shape, minimizing the levelled area to the extent practical while still allowing well maintenance activities and workovers to take place.

31) A monitoring plan has been developed and can be found in Appendix J: Monitoring Plan (2008 Environmental Protection Plan (JWA 2008)).

32) All survey stakes, etc. will be removed when pipeline and road construction is complete.

33) Petro-Canada will reclaim sections of the fuel gas line right-of-way along Highway 532 that are proposed to be abandoned as part of this Project. Petro-Canada will consult with Alberta Sustainable Resource Development to investigate techniques to exclude all-terrain vehicles from reclaimed sections. Circulate this within Petro-Canada.

34) Reclamation monitoring plots will be established in order to monitor successional trends.

35) Petro-Canada will monitor reclamation for at least five years following construction.

36) Signs will be installed at appropriate locations stating a reclamation project is in progress.

37) Erosion control measures including berms, water diversion structures, erosion control matting, tackifiers and seeding will be used to protect steep slopes from water and wind erosion (see Appendix E: Construction Typicals, 2008 Environmental Protection Plan [JWA 2008]).

38) A reclamation specialist and Alberta Sustainable Resource Development will be consulted with respect to seed mixes and re-vegetation techniques.

39) The seed mixes that will be used are specified in Appendix I: Reclamation Plan (2008 Environmental Protection Plan [JWA 2008]) and the mix number is identified in Appendix G: Reclamation Alignment Sheets (2008 Environmental Protection Plan [JWA 20008]). Seed mixes will be finalized closer to construction when seed availability is known. Site conditions may require alternate seed applications.

40) Seeding will closely follow topsoil and surface material replacement (depending on the timing of final cleanup). Seeding of native species will be targeted for spring.

41) Cover crops may be used at erosion-prone sites. Petro-Canada will only use Certified Canada No. 1 seed for cover crops.

42) Certificates of seed analysis will be obtained for all seed required and will be reviewed and approved by Petro-Canada and Alberta Sustainable Resource Development prior to purchase.

43) Additional planting of native vegetation, including grass, shrub and tree plugs will be carried out in specified areas on the reclaimed pipeline (e.g., west of the 10-25 well site in the Flat Creek corridor) (see Appendix I: Reclamation Plan, 208 Environmental Protection Plan [JWA 2008].

Operations Phase

1) Petro-Canada is committed working with Eden Valley to develop an appropriate communication system for the residents of the Eden Valley Reserve. Options include cell phone towers and boosters, sirens, horns, etc. Details will be worked out with service

providers and the nation. This will be initiated in the construction and drilling phase and will be fully operational in time for the beginning of production from the Sullivan Field.

2) Mitigation commitments made to Indian Graves Campground (IGC) are contained in a letter filed with ERCB dated 11 November 2008. The letter covers a number of mitigation measures specific to operations and IGC including security patrols for access management on long weekends during first year of operations; establishment of communication facilities at IGC (e.g. cell towers, land line – method to be determined); evaluation and possible addition of shelter-in-place capacity; and H_2S awareness initiatives.

3) Petro-Canada will install descriptive signage at appropriate locations along the pipeline right-of-way, potentially where trails cross the pipeline right-of-way or where there is some observed current human activity. The signage would alert the public to the presence of a sour gas pipeline; and secondly, would provide advice on what to do if they were to smell H_2S.

4) Petro-Canada will put up more signage than is typically required by Alberta Energy Resources Conservation Board to alert the public to the presence of sour gas facilities.

5) Appendix L: Access Management Plan (2008 Environmental Protection Plan [JWA 2008]) will be updated to reflect operations phase conditions. Access management measures (e.g. locked gates) will be maintained.

6) Speed limits along field access roads will be maintained during operations.

7) The frequency and volume of routine operations traffic to the well pads, emergency shutdown valve sites and central facility will be minimized through the implementation of supervisory control and data acquisition (SCADA) systems. Well and emergency shutdown valve inspections will continue to be part of routine operations.

8) The frequency of trucking sour water out from the central facility will be minimized and is anticipated to be one truck every seven to ten days.

9) If repairs are necessary that require access to the reclaimed right-of-way by construction equipment, Petro-Canada will work with local stakeholders and regulators including Alberta Sustainable Resource Development and the Department of Fisheries and Oceans Canada to establish a plan that would ensure the protection of environmental resources.

10) Petro-Canada will monitor access control measures to ensure these are effective. Monitoring will also involve frequent and ongoing communication with local stakeholders.

11) All gathering lines and trunk line will be inspected by helicopter annually for potential erosion and stability issues. The line will be physically inspected in the even that the aerial inspection suggests that further investigation is required.

12) Sedimentation and erosion control inspections will be completed on the road right-of-ways to ensure creeks and streams in the area are not adversely affected. These inspections will occur on a monthly basis until reclamation is deemed successful.

13) Following construction, monitoring of right-of-ways and crossing locations within the gathering system will occur on a monthly basis for the first year following construction. Monitoring of the trunk line will also occur on a monthly basis for the first year following construction or on a frequency that is appropriate based on the inspection results.

14) During the first year of monitoring when activity is most intensive, monitors will conduct monitoring activities on foot or on horseback, where feasible.

15) All permanent watercourse crossing, temporary crossing sites, pipeline crossing sites and associated sediment and erosion control structures will be inspected regularly. Once all sites are sufficiently stabilized, inspections will be carried out annually.

16) Department of Fisheries and Oceans Canada's Alberta Operational Statements for Crossing Maintenance (e.g., bridge maintenance, culvert maintenance, riparian vegetation) will be followed during operations (DFO 2007a, 2007c and 2007d, internet sites).

17) Specific locations will be monitored to evaluate reclamation success, in accordance with Appendix J: Monitoring Plan (2008 Environmental Protection Plan [JWA 2008]).

18) A vegetation management plan will be developed for the operations phase. Mitigations for invasive, nonnative and weed species may include cleaning equipment and continued problem vegetation monitoring.

19) Herbicide use will be minimized, but will likely be required for noxious and restricted weed control (e.g., Canada thistle). Vegetation control will employ mechanical brushing to the extent practical.

20) The location of rare species and rare ecological communities will be indicated to personnel conducting vegetation control. Herbicide use will be avoided within 30 m of these sites. If weeds are an issue in the vicinity of rare plants or rare communities, alternative weed management techniques will be considered.

21) The pipeline right-of-way will be allowed to re-grow and will not be cleared of encroaching vegetation.

22) It is Petro-Canada's intent is to locate operators close to the Sullivan facilities (e.g., Black Diamond, Longview).

23) Operations staff will work from the central facility primarily during daytime hours.

24) It is expected that lighting at the central facility will remain off unless operations personnel are on site and lights are required.

25) The central facility will be fenced and gated during the operations stage. Well pads may also be fenced.

26) All tanks for bulk fluid containment at the central facility will be double-walled and any fill or drain spouts on the tanks will have spill containment below them, either permanent or brought in with the truck supplying the product. The sour water storage tank will be double-

walled, and instrumented and alarmed for level monitoring and high level alarms and shut downs.

27) Production equipment and facilities on well pads will be monitored for leaks and spills.

28) All trucks hauling sour water will be sealed units and have a system to control any odours that may result during trucking.

29) All oils, cylinders and other controlled substances will be contained and stored on site according to provincial regulations.

30) Spill response equipment will be kept at the central facility in case of a leak or emergency.

31) Bins for wastes such as rags and filers will be secured against easy entry (i.e., bear proof) and will be routinely emptied. Any fuels, lubricants and hydrocarbon wastes will be collected and disposed of regularly at approved disposal sites.

32) A groundwater monitoring system (involving multiple monitoring wells) will be implemented at the central facility to allow groundwater to be tested before the facility is operated and on an ongoing basis during operations.

33) Petro-Canada will undertake interstitial monitoring of the double-walled tanks at the central facility site.

34) Noise mitigation measures will be implemented into the design of the central facility.

35) During routine operations along the trunk line, all-terrain vehicles (ATVs) will be used approximately two to four times a year to access the emergency shutdown valve sites via pre-approved trails and/or portions of the pipeline right-of-way. No travel along pipeline right-of-ways in the gathering system is anticipated during operations.

36) Portions of the right-of-way will require rudimentary maintenance to allow passage of an all-terrain vehicle (ATV) to access emergency shutdown valve sites on the trunk line. Quad bridges or fords will be required on access trails and on the reclaimed pipeline right-of-way or shooflies. Appropriate crossings methods will be determined prior to construction in consultation with Department of Fisheries and Oceans Canada and Alberta Sustainable Resource Development.

37) H_2S monitors will be installed at well pads, the central facility and trunk line emergency shutdown valves will be linked to the operations alarm system via supervisory control and data acquisition (SCADA) systems.

38) Petro-Canada will conduct additional H_2S monitoring along the trunk line adjacent to the Eden Valley Reserve.

39) Petro-Canada will shut in operations if a single H_2S odour complaint is received (note that in the Eden Valley Reserve area, shut in will be triggered by either two complaints or a single complaint plus an alarm signal on the emergency shutdown valve site or fence-line monitor).

40) Petro-Canada is willing to run emergency response exercises at the Eden Valley Reserve and have the residents at Eden Valley participate in these exercises. It is Petro-Canada's intention to do an exercise prior to commencement of operations.

41) Petro-Canada will attempt to retain and train individuals from the Eden Valley Reserve to act as emergency responders/rovers.

42) Ensure that facilities are painted in dark earth tones with non-reflective surfaces.

43) Options will be explored to protect aboveground facilities (e.g., emergency shutdown valves) from damage.

44) Detailed reclamation plans will be developed at the decommissioning and abandonment phase. Reclamation will be carried out in accordance with reclamation requirements in force at the time of final reclamation.

APPENDIX 2 DEFINITIONS

CALMET – A diagnostic three-dimensional meteorological model. It is a part of the CALPUFF Modelling System, which is one of the preferred models designated by the United States Environmental Protection Agency in its *Guideline on Air Quality Models*.

Environmental assessment (EA) – An assessment that allows companies and government decision-makers to examine the effects that a proposed project may have on the environment.

ERCBH2S – A software program that calculates site-specific EPZs using thermodynamics, fluid dynamics, atmospheric dispersion modelling, and toxicology.

MM5 – Short for Fifth-Generation NCAR/Penn State Mesoscale Model, the MM5 is a regional mesoscale model used for generating weather forecasts and climate projections. AENV enforced its requirements with MM5-developed meteorological data from 2002 to 2006.

Noise impact assessment (NIA) – An assessment required by ERCB *Directive 038* to ensure that licensees consider possible noise impacts before a facility is constructed or in operation.

Project – Collectively, all the applications put forth by Petro-Canada.

Setback – The absolute minimum distance that must be maintained between any energy facility (e.g., a drilling or producing well, a pipeline, or a gas plant) and a dwelling, rural housing development, urban centre, or public facility. Setbacks vary according to the type of development and whether the well, facility, or pipeline contains sour gas.

Shelter in place – Remaining indoors for short-term protection from exposure to toxic gas releases.

Urban centre – A city, town, village, summer village, or hamlet with no fewer than 50 separate buildings, each of which must be an occupied dwelling, or any similar development the ERCB may designate as an urban centre.

Urban density development – Any incorporated urban centre, unincorporated rural subdivision, or group of subdivisions with no fewer than 50 separate buildings, each of which must be an occupied dwelling, or any other similar development the ERCB may designate as an urban density development.

APPENDIX 3 HEARING PARTICIPANTS

Principals and Representatives (Abbreviations used in report)	Witnesses
Petro-Canada W. T. Corbett, Q.C. R. S. Kolber	C. Briggs, P.Biol., of Jacques Whitford AXYS Ltd. R. Brown of Bissett Resources Consultants Ltd. D. Davies, Ph.D., of Intrinsik Environmental Sciences Inc. M. Davies of Jacques Whitford AXYS Ltd. I. Dowsett of First Response Emergency Services R. Eccles, P.Biol., of Jacques Whitford AXYS Ltd. J. Freeman, P.Geol., of Matrix Solutions Inc. J. Kerkhoven R. Lakeman R. Manwaring L. E. Mooney, P.Eng., of Moon Resources Inc. J. O'Mahony of Colt Engineering Alliance D. Olson, Ph.D., of O2 Planning and Design Inc. J. Rasmussen, P.Eng. W. Schroeder D. Soppet of Jacques Whitford AXYS Ltd. J. Tischer of FMA Heritage Resources Consultants L. Zilm, P.Ag.
The Big Loop Group S. Carscallen, Q.C. B. Carscallen	C. Bartlett of High Lonesome Ranch Limited, EP Ranch Limited, and MHI Energy Partners C. Bradley, P.Biol. K. Beunder of Longview Planning and Design L. Fitch, P.Biol., of Alberta Riparian Habitat Management Society G. Follensbee of Compton Petroleum C. Gardner of Municipal District of Ranchlands No. 66 D. Hermanson of Landmark Projects T. Kaminski of Mountain Livestock Cooperative C. Mamo D. Mayhood of Freshwater Research Limited

Stoney Nakoda Nations
O. MacLaren
D. Rae

K. Lefthand of Bearspaw First Nations

Royal Adderson and Bar Ad Ranches Ltd. (Adderson)
D. Farmer
G. Fitch

R. Adderson of Bar Ad Ranches Ltd.
D. Finch
B. Leeson of Bruce F. Leeson Environmental Consulting Co.
A. G. MacHutchon, R.P.Bio.
B. Stelfox of University of Alberta and University of Calgary

Pekisko Group
J. Laycraft, Q.C.

M. Blades of Rocking P Ranch
G. Cartwright of D Ranch
L. Dayment of Willow Creek Stock Association
F. Gardner of Mt. Sentinel Ranch Ltd.
R. Kennedy, D.V.M., Ph.D.
C. Lockton of Willow Creek Stock Association
M. Tremblay of Leger Marketing

Attorney General of Alberta
J. Krowina

Discretionary Participants
M. Blades of John Scott Motion Pictures
R. Douglas of Alberta Wilderness Association
F. J. Dover of Priddis Millarville Residents Association
M. Dowdell
H. Gardner of Bluebird Valley Ranch
J. Walker of Full Circle Adventures

Energy Resources Conservation Board staff
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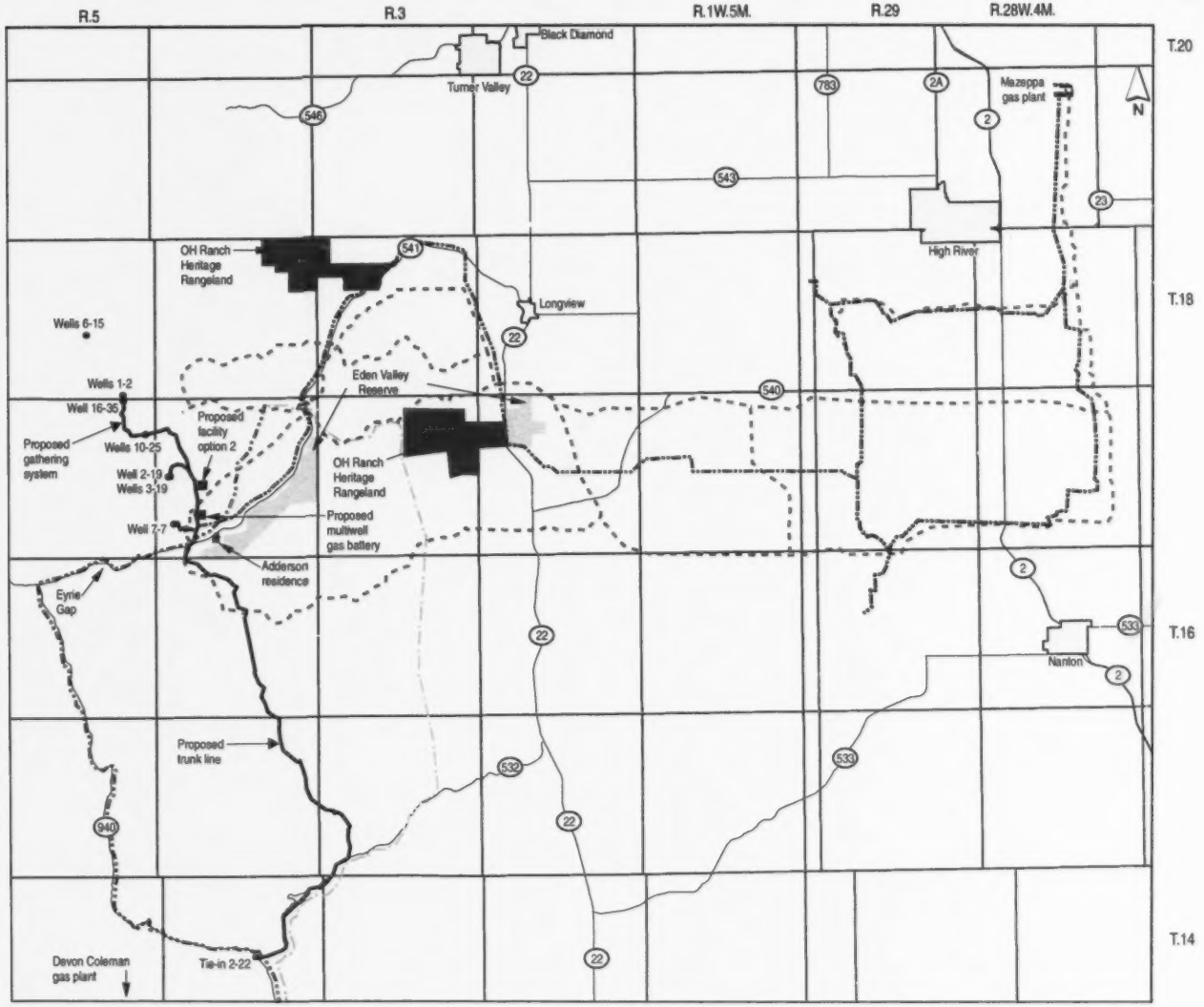
T. Grimoldby, Board Counsel
D. Barter
A. Braaten
B. Greenfield, P.Biol.
M. Gonie
S. Lee, P.Eng.
M. Louie
G. McClenaghan, P.Eng.
D. Miles
T. Novotny, P.Ag.
C. Ravensdale
K. Siriunas, P.Eng.



Legend

Proposed gathering system
Proposed trunk line
541/940 alternative route
Pekisko alternative route
Mazeppa alternative routes
Beunder alternative route
Existing pipeline

Figure 1. Applied-for wells, battery, and pipelines and alternative routes

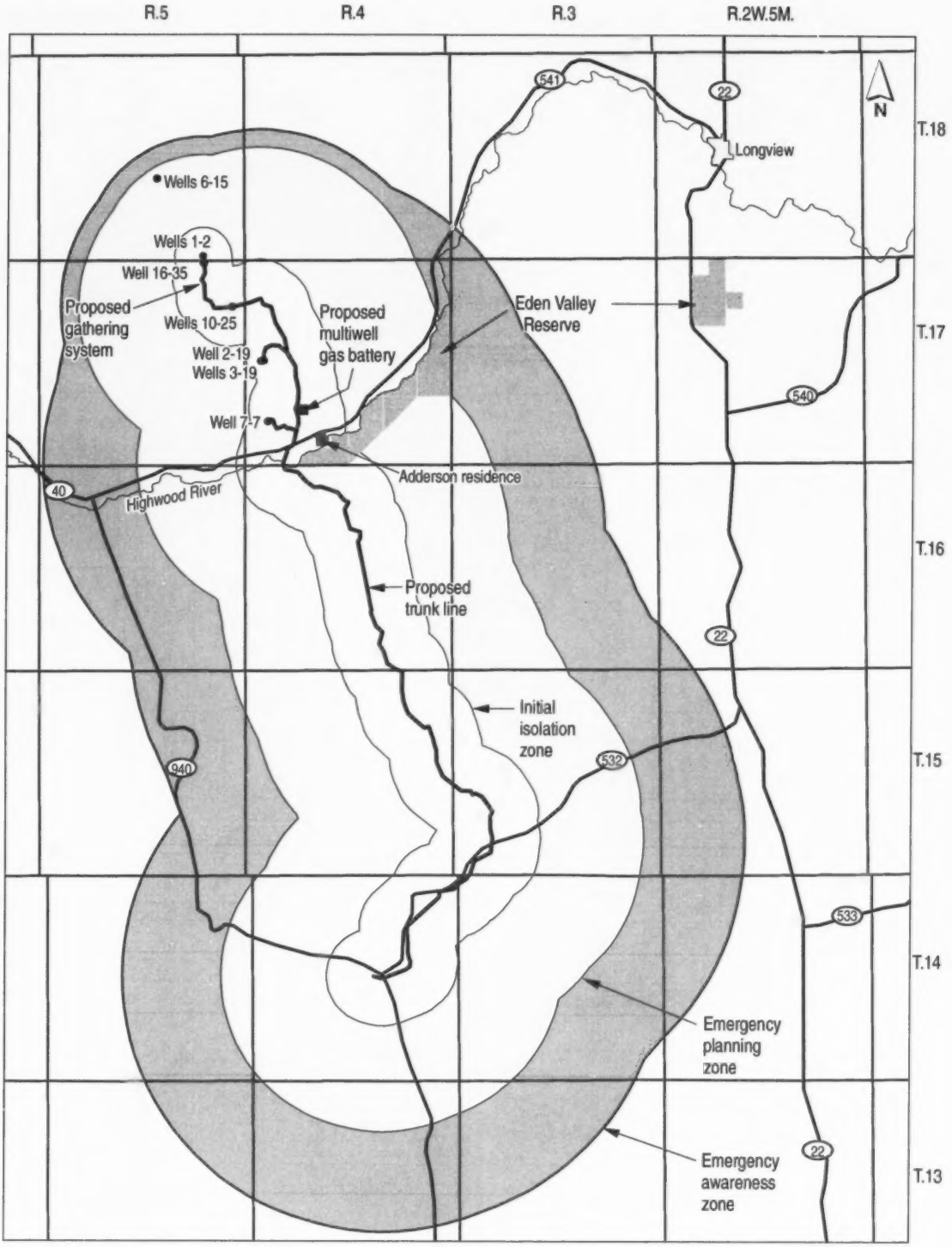


Figure 2. Emergency response planning zones

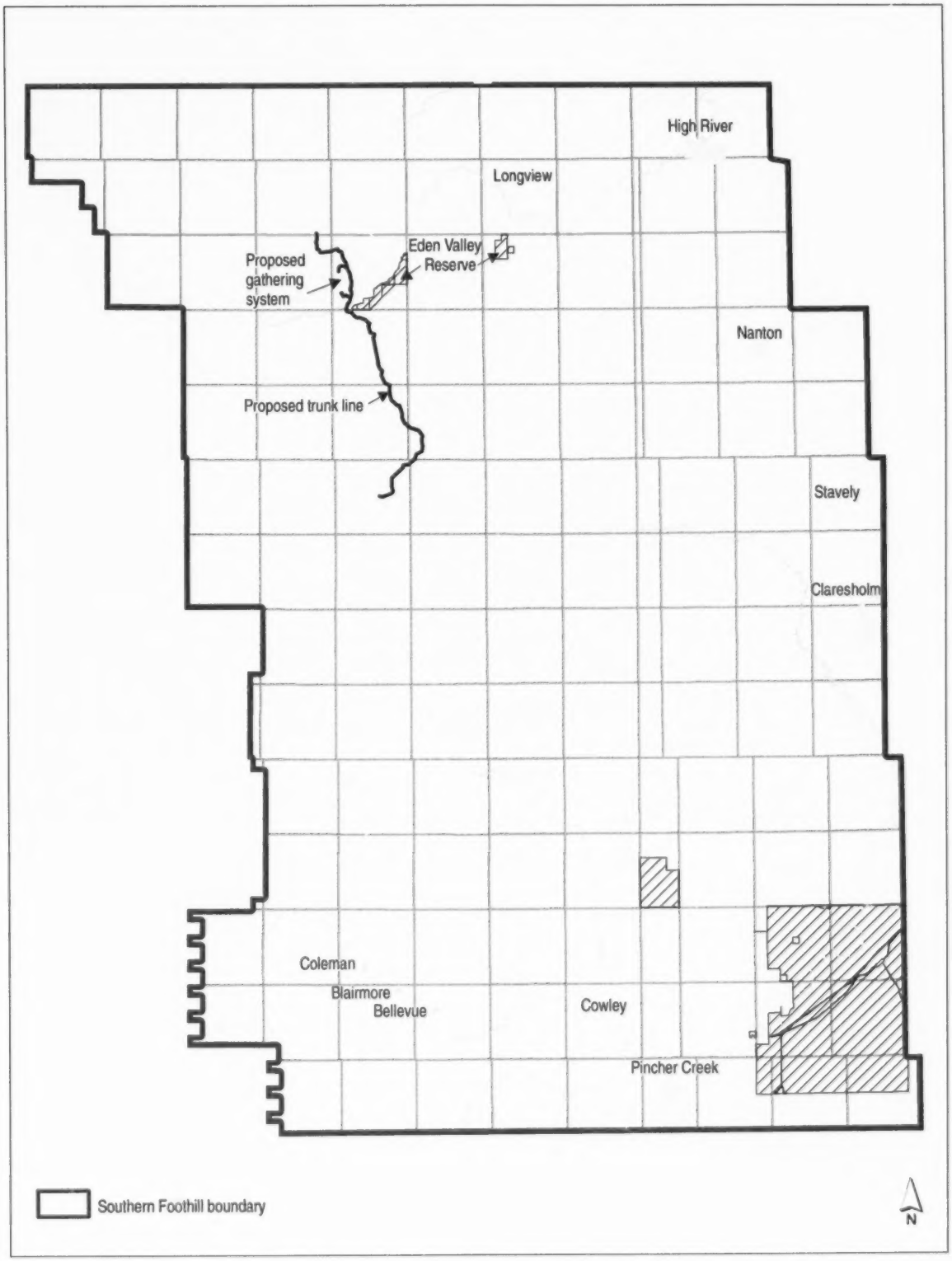


Figure 3. Southern Project area in relation to the Southern Foothills Study

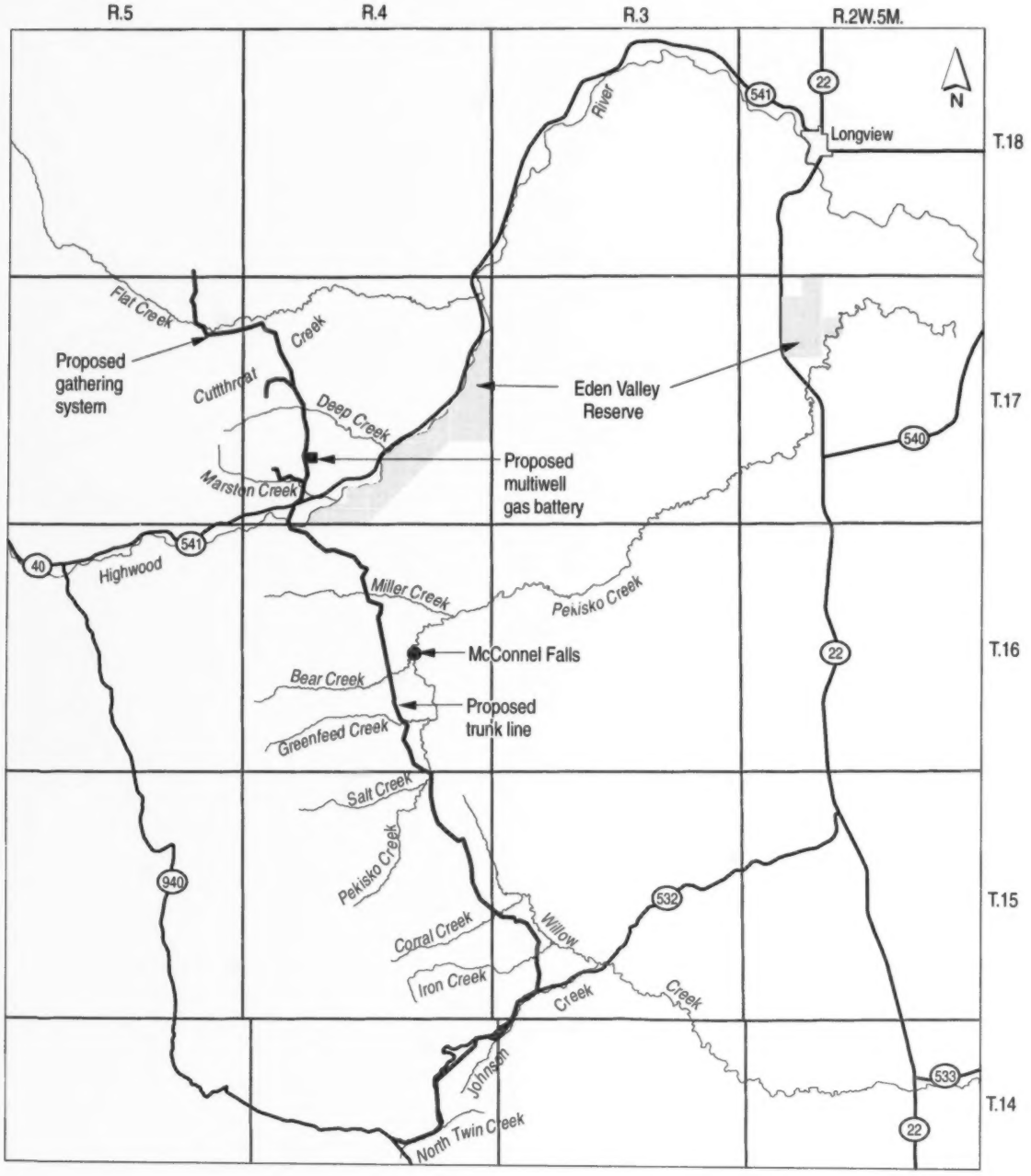
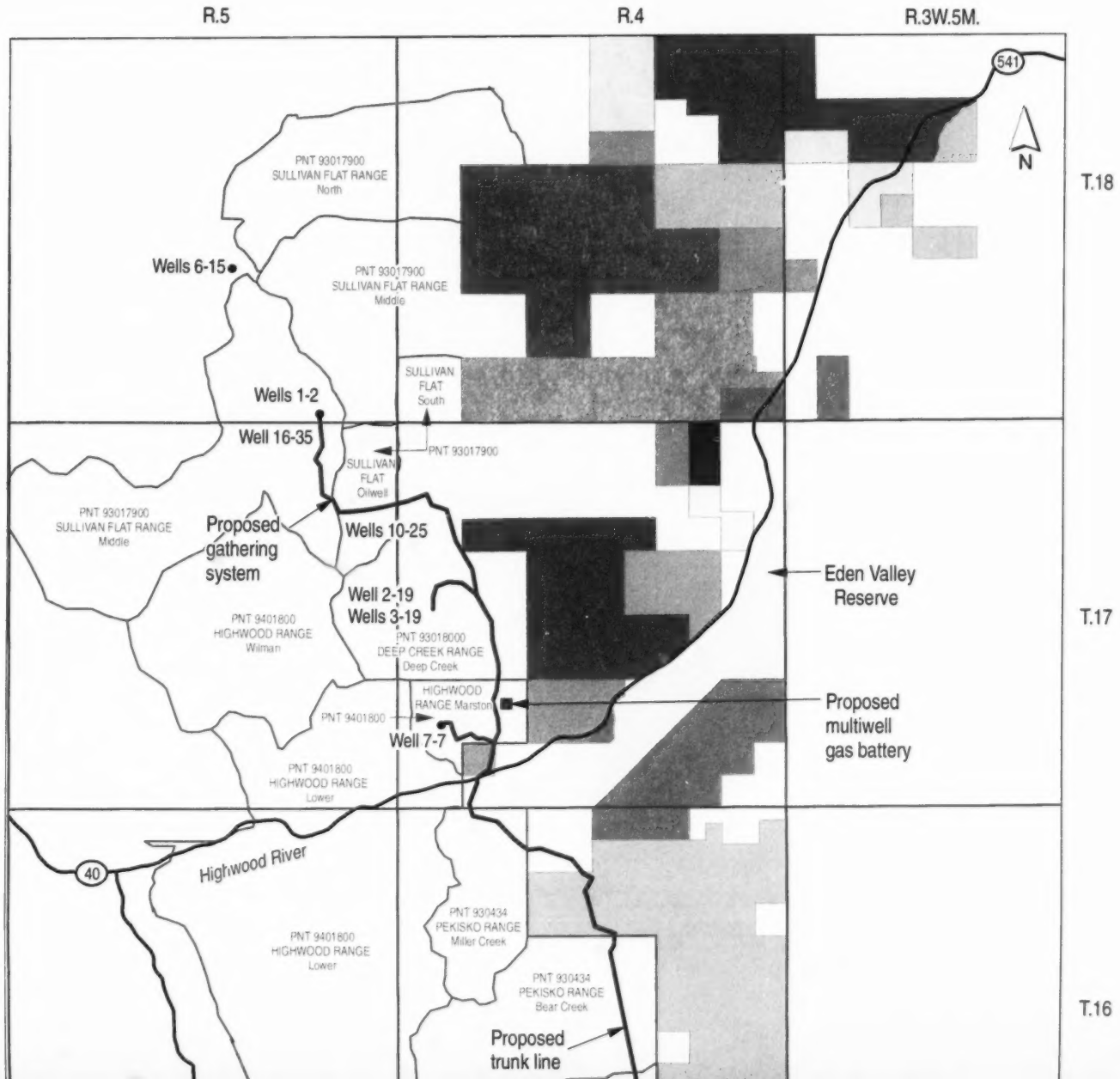


Figure 4. Main stem watercourses to be crossed by the Project


R.5
R.4
R.3W.5M.
541
N
T.18
T.17
T.16
PNT 93017900
SULLIVAN FLAT RANGE
North
Wells 6-15
PNT 93017900
SULLIVAN FLAT RANGE
Middle
SULLIVAN
FLAT
South
Wells 1-2
Well 16-35
PNT 93017900
SULLIVAN
FLAT
Oilwell
PNT 93017900
SULLIVAN FLAT RANGE
Middle
Proposed
gathering
system
Wells 10-25
Well 2-19
Wells 3-19
Eden Valley
Reserve
PNT 9401800
HIGHWOOD RANGE
Wilman
PNT 93018000
DEEP CREEK RANGE
Deep Creek
HIGHWOOD
RANGE Marston
Proposed
multiwell
gas battery
PNT 9401800
Well 7-7
PNT 9401800
HIGHWOOD RANGE
Lower
40
Highwood River
PNT 9401800
HIGHWOOD RANGE
Lower
PNT 930434
PEKISKO RANGE
Miller Creek
PNT 930434
PEKISKO RANGE
Bear Creek
Proposed
trunk line

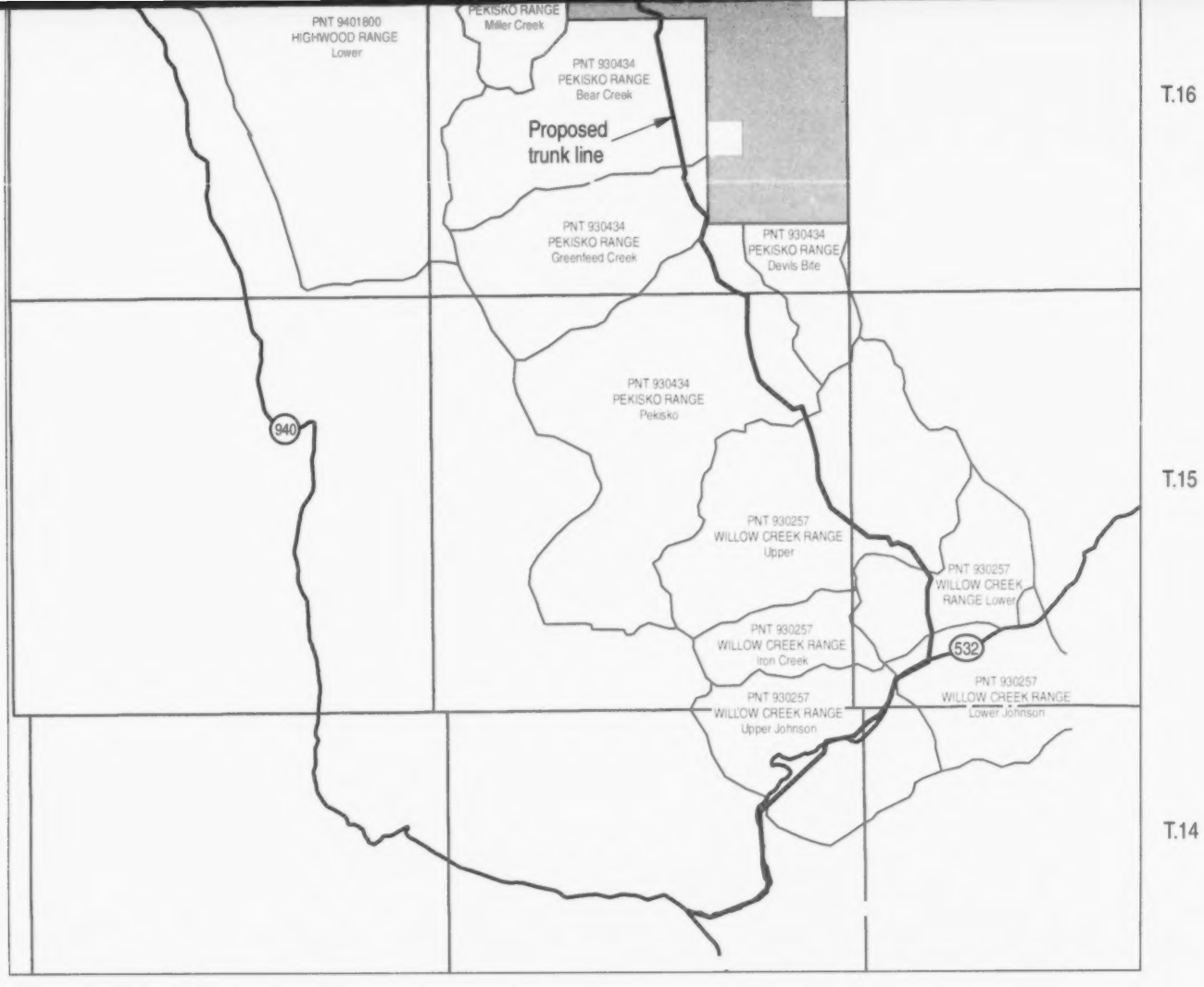


Figure 5. Grazing leases and allotments